FOOD MANUFACTURE

Incorporating Food Industries Weekly

HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 NOVEMBER 1, 1954

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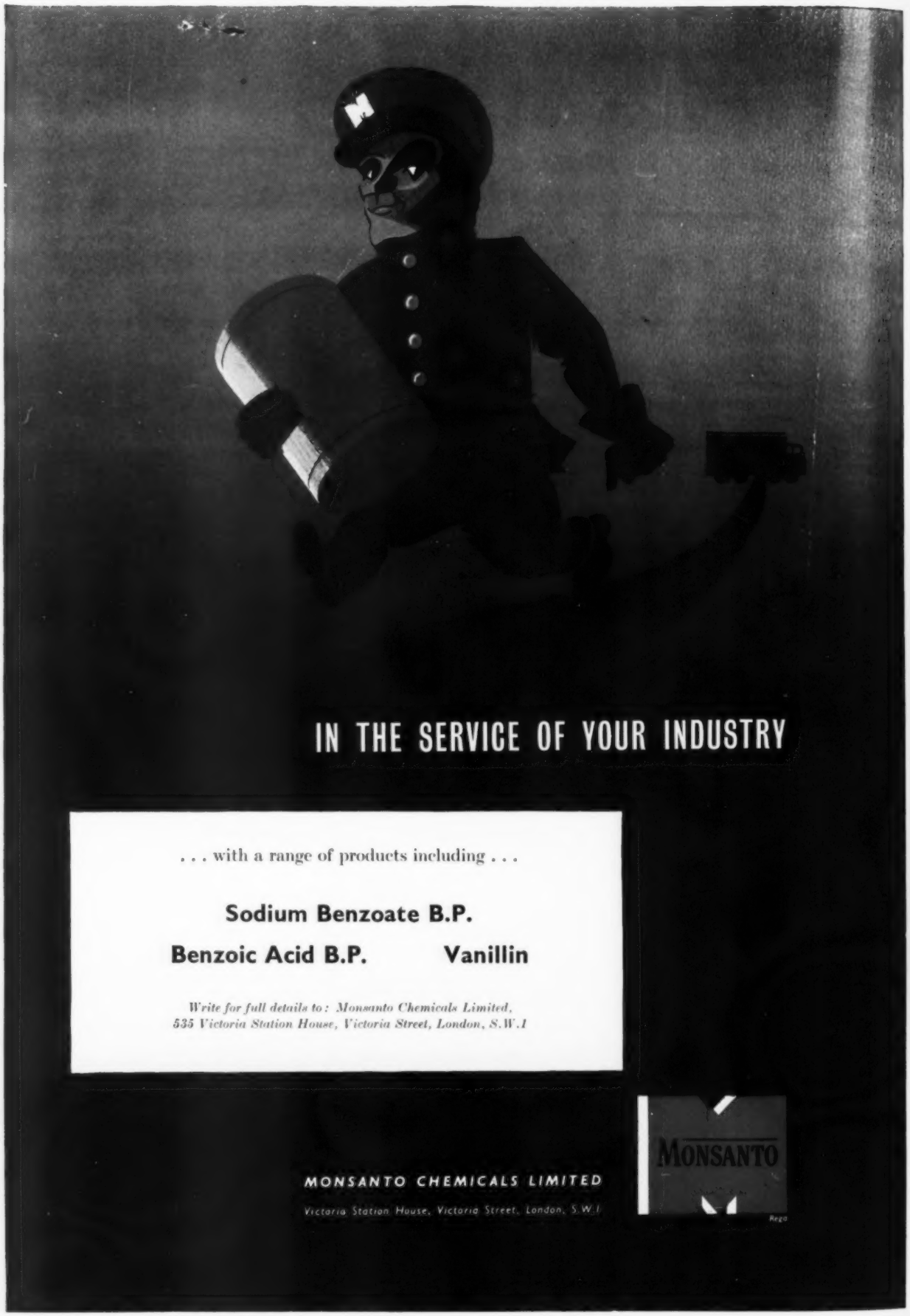
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MONSANTO

"Give me room!"

GASPED THE PRODUCTION MANAGER

"I'm being choked", he said. "I'm producing the goods faster than ever, but what's the good? I've got to slow down to enable the stuff to be moved off the floor. I've carried on somehow, but this is the end. Come and look." We did.

His production machinery was tip-top, but oh!—his materials handling equipment was right out of the Ark! "For months now I've been nagging the Board to call in Yale", he moaned, "but they just wouldn't listen."

"Well, now we're here, let's get down to it", we said as gently as we could. He showed us what wanted moving—how far—and how often. Together we worked out a scheme that did all that and increased his effective storage space more than 25%!

Now he's producing to capacity, his handling costs are less than he had ever hoped and the Yale trucks are giving him the kind of trouble-free service he'd only dreamed about.

IS LACK OF SPACE RESTRICTING YOUR OUTPUT?

Yale's versatile

"WORKSAVER"

is specially suitable for smaller plants

FORK LIFT *Lifts, moves and stacks over low-load floors: saves time, space and manpower wherever it's put to work.*

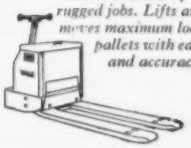
AMONG the wide range of Yale handling equipment the "Worksaver" series of trucks is of special interest to factories where restricted space or low-load floors have previously made mechanical handling impractical. Its small size, light weight and extreme ruggedness give big-truck advantages with small-truck economy and convenience.

It will lift, move and stack raw materials or finished products. It saves time, space and manpower. You can ride it or walk it. And it will start cutting costs from the minute you put it to work.

The "Worksaver" is available in five basic types: pallet, low lift platform, high lift platform, fork lift and tractor.

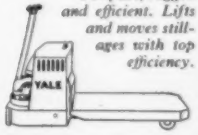
PALLET

Built to stand up to rugged jobs. Lifts and moves maximum load pallets with ease and accuracy.



PLATFORM

Compact, rugged and efficient. Lifts and moves stillages with top efficiency.



TRACTOR

A powerful and manœuvrable tractor unit to pull trailers or trailer trains with up to 700 lbs. drawbar pull.

YOU GET ALL THESE ADVANTAGES WITH THE "WORKSAVER"

- *Manœuvrable in small spaces and narrow aisles.*
- *Light weight with great strength and power permit heavy duty work on low-load floors.*
- *Dead man control cuts power and applies brakes automatically in emergency.*
- *Simple fingertip controls—unskilled staff can move, lift and stack with speed and safety.*
- *Low initial cost, low running cost, economical maintenance, long life.*

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Index to ADVERTISERS

	Page
Accles & Pollock, Ltd.	Dec.
Advita, Ltd.	cxiv
Agricultural & Chemical Products, Ltd.	cxvii
Airguard, Ltd.	cxvi
Albro Fillers & Engg. Co. Ltd.	Oct.
Alfa-Laval Co., Ltd.	xxxix
Alginate Industries, Ltd.	Dec.
Alite Machines, Ltd	Oct.
Allen, Stafford, & Sons, Ltd.	xxxvi
Allspeeds, Ltd.	c
Anderson, C. F., & Son, Ltd.	xciv
Angel Warehouse Co., Ltd	cxix
Anglo-American Plastics, Ltd.	Oct.
Anglo-American Vulcanized Fibre Co., Ltd.	Oct.
A.P.V. Co., Ltd.	Oct.
Arabol Mnfg. Co., Ltd.	Dec.
Argentine Government	Sept.
Associated MetalWorks, Ltd.	Oct.
Autopack, Ltd.	Sept.
Barron, W. S., & Son, Ltd.	Oct.
Bayer Products, Ltd.	Aug.
Bear Honey Co., Ltd	Aug.
Beddington Nut & Produce Co., Ltd.	cxviii
Begg, Cousland & Co., Ltd.	Oct.
Bellingham & Stanley, Ltd.	Oct.
Benjamin Electric, Ltd.	xiv
Bennett, Sons & Shears, Ltd.	lix
Benninga (Mitcham), Ltd.	Sept.
Benton & Stone, Ltd.	xlviii
Bertrams, Ltd.	Sept.
Betts & Co., Ltd.	Oct.
Birmingham Chemical Co., Ltd.	xliii
Blakeborough, J., & Sons, Ltd.	cxvi
Blaw Knox, Ltd.	xlv
Bliss, E. W. (England), Ltd.	xxxii
Boehm, Fredk., Ltd.	ci
Bonniksen & Cronk, Ltd.	May
Bos, F., Ltd.	cviii
Bowaters Sales Co., Ltd.	xl, xli
Bowser, Monks & Whitehouse, Ltd	Oct.
Braby, Fredk., & Co. Ltd.	viii
Bramigk & Co., Ltd.	Oct.
Bramwell, S., & Co., Ltd.	lxxxi
Brewers' Food Supply Co., Ltd.	xciv
Brierley, Wm., Collier & Hartley, Ltd	cxi
British Belting & Asbestos, Ltd.	lxii
British Cellophane, Ltd.	xx
British Electrical Development Association	xxxviii
British Hydrological Corporation	xvi
British Industrial Plastics, Ltd.	xvii
British Industries Fair	Oct.
British Jeffrey-Diamond Ltd.	cxi
British Rayophane, Ltd.	Oct.
British Thomson-Houston Co. (Rugby)	Aug.
British Wedge Wire Co., Ltd.	xviii
Broadbent, Thomas, & Sons, Ltd.	lxviii
Brockhouse Heater Co., Ltd.	cxv
Brook Motors, Ltd.	xxxi
Brown Fintube (Great Britain), Ltd.	Mar.
Brown & Forth, Ltd.	cxvi
Brown & Polson, Ltd.	Oct.
Bryan, Wm. Ltd.	c
Building Trade Supplies	Oct.
Bulmer, H. P., & Co., Ltd.	Oct.
Bush, W. J., & Co., Ltd.	Cover i, cviii
Buss, Ltd.	Feb.
Butterfield, W. P., Ltd.	Oct.
Caleb Duckworth, Ltd.	Oct.
Calfos, Ltd.	xcviii
Cambitzi, G., & Co., Ltd.	cviii
Cambridge Instrument Co., Ltd.	Oct.
Canning Town Glass Works, Ltd.	cx
Caribbean Commercial Agency	Oct.
Chamberlain & Willows	cxvi
Chelsea Flour Mills, Ltd.	Sept.
Cinema-Television, Ltd.	Oct.
Clarke-Built, Ltd.	vi
Clark, George, & Co., Ltd.	June
Clark, T. & C., & Co., Ltd.	Oct.
Coates Bros. Inks, Ltd.	xxviii
Cohen, George, Sons & Co., Ltd.	v
Colt Ventilation	x
Commer Cars, Ltd.	liv
Confectioners' Vegetable Colours & Fruit Essence Co., Ltd.	cvi
Constantin (Engineers) Ltd.	xlix
Coombs, H. A., Ltd.	Oct.
Cooper, McDougall & Robertson, Ltd.	Sept.
Corn Products Co., Ltd.	Oct.
Creamery Package Mnfg. Co., Ltd.	Sept.
Crofts (Engineers), Ltd.	lxi
Crompton Parkinson, Ltd.	Sept.
Cumming, Parsons, Ltd.	xcvi
Cuxson, Gerrard & Co., Ltd.	Oct.
Dale, John, Ltd.	Aug.
Danks, Edwin, & Co., Ltd.	Oct.
Davey, Paxman & Co., Ltd.	Oct.
Davis, H. & C., Ltd.	civ
Dawson Bros., Ltd.	xlvi, xlvii
De La Rue, Thomas, & Co., Ltd.	Mar.
Demby, Hamilton & Co., Ltd.	July
Denton & Jutsum, Ltd.	April
D.M.P. Sales, Ltd.	xxii
Drakesons	cxvii
Drayton Regulator & Instrument Co.	Cover iv
Duche, T. M., & Sons, Ltd.	cxviii
Electropower Gears, Ltd.	lxxxviii
Electrolux, Ltd.	Oct.
English Grains Co., Ltd.	lxxxvi
Evan Cook's Packers, Ltd.	June
Evans, Wm., & Co., Ltd.	Oct.
Everitt & Co., Ltd.	Oct.
Fatoils, Ltd.	Oct.
Feaver, John, Ltd.	ix
Felber, Jucker & Co., Ltd.	Oct.
Fell & Briant, Ltd.	Oct.
Fenner, J. H., & Co., Ltd.	cxii
Filling Machines, Ltd.	July
Finch & Knight, Ltd.	Sept.
Fisher & Ludlow, Ltd.	Sept.
Fishers' Foils, Ltd.	Oct.
Fison, Edward, Ltd.	xxiv
Flexible Packaging, Ltd.	xv
Flexo Plywood Industries, Ltd.	Oct.
F.M.S. (Farm Products), Ltd.	lxxx
Food Machines (Slough), Ltd.	July
Fox, Samuel, & Co., Ltd.	Sept.
Frankfurt International Fair	Feb.
Fraser, J., & Son Ltd.	cx
Frischmann, H.	cvi
Fuller Horsey, Sons & Cassell	cxvi
Gardner, Wm., & Sons, (Glos.) Ltd.	Oct.
Garrould, E. & R., Ltd.	Oct.
Garvin, L., & Co., Ltd.	cxiv
Gas Council	lxx
G.C. Engineering Co., Ltd.	Oct.
Gearaide, Ltd.	June
Gee Manufacturing Co., Ltd.	Oct.
General Electric Co., Ltd.	xii, lxvi
Girdlestone Pumps, Ltd.	cviii
Giusti, T., & Son, Ltd.	lxxxviii
Glentham Essence Co., Ltd.	lxxxiv
Gloy & Empire Adhesives, Ltd.	cxiv
Goring Kerr, Ltd.	Sept.
Gosheron, John, & Co., Ltd.	xcviii
Graham & Co., Ltd.	Oct.
Grew, James, & Co., Ltd.	Sept.
Gunson, R. W. (Seeds), Ltd.	cxv
Haller & Phillips, Ltd.	Oct.
Hamburger, M., & Sons	cxii
Hangers Paints, Ltd.	June
Hanovia, Ltd.	July
Hardaker, John T., Ltd.	lxxxvi
Harvey, G. A., Ltd.	xcv
Havinden, G., Ltd.	June
Herbert, Sidney, & Co.	April
Heston Equipment Co., Ltd.	xxvi
High Duty Alloys, Ltd.	July
Hogg, Thos.	May
Holden & Brooke Ltd.	Sept.
Honeywell-Brown, Ltd.	liii
Hopkin & Williams, Ltd.	xcv
Hopkinsons, Ltd.	xcvii
Horton Mnfg. Co., Ltd.	xcvii
Howard Pneumatic Engg. Co., Ltd.	lxiii
Howards (Colney), Ltd.	xcix
Hubbard, W. J., & Sons, Ltd.	May
Hull Development Committee	Oct.
Hunt, John (Bolton), Ltd.	lvi
Imperial Chemical Industries, Ltd.	xxv, xlii
Incandescent Heat Co., Ltd.	Oct.
Insecta Laboratories, Ltd.	July
International Exhibition of Gastronomy and Tourism	June
J. & R. (Butchers) Supplies, Ltd.	July
Jackson, Henry (Liverpool), Ltd.	lxxxv
Jenkins, Robert, & Co., Ltd.	lxxxvii
Jenner, A. & C., Ltd.	lxix
Johsons, Andrew, & Son, Ltd.	April
Johnson, A., & Co., Ltd.	Oct.
Johnson & Johnson (Great Britain), Ltd.	Oct.
Johnsons (Darley Dale), Ltd.	June
Jones Cranes	v
Jones, Samuel, Co., Ltd.	xxii
Kane, Frederick C., Ltd.	Mar.
Kek, Ltd.	Oct.
Kellie, R., & Son, Ltd.	lviii
Kellys, John (London), Ltd.	Mar.
Kemball, Bishop & Co., Ltd.	Oct.
Kemp, Frank, Ltd.	Oct.
Kestner Evaporator & Engg. Co., Ltd.	ciii
Kidde, Walter, Co., Ltd.	lxxviii
Kimpton Bros., Ltd.	Oct.
Lacy-Hulbert & Co., Ltd.	Oct.
Lambert, L., & Co., Ltd.	ciii
Lautier Fils, Ltd.	cxiii
Leiner, P., & Sons, Ltd.	Oct.
Levasseur, L., & Co., Ltd.	Sept.
Loders & Nucoline, Ltd.	lxxxiii
Loma Electronic Equipment, Ltd.	Oct.
Longwood Engg. Co., Ltd.	cv
Machinery (Continental), Ltd.	Aug.
Magnetic Valve Co., Ltd.	xcvi
Maitlands (Metal Works), Ltd.	cxx
Marshall, A. L. (Carlton), Ltd	cvii
Mather & Platt, Ltd.	Oct.
May & Baker, Ltd.	cix
Measurement, Ltd.	lxvii, ci
Medway Corrugated Paper Co., Ltd.	Oct.
Metafiltration Co., Ltd.	cix
Metal Box Co., Ltd.	xv, xix
Metal Closures, Ltd.	xxiii
Metal Propellers, Ltd.	Oct.
Microsol Industries, Ltd.	Sept.
Midland Dairy M·Cs. Ltd.	Oct.
Midland Silicones, Ltd.	Feb.
Mitchell Engineering, Ltd.	July
Mono Pumps, Ltd.	cxiii
Monsanto Chemicals, Ltd.	Cover ii
Morton, Robert & Co., Ltd.	Sept.
Myers & Foulkes	June
National Adhesives, Ltd.	lv
National Glass Works (York), Ltd.	cxx
Negretti & Zambra, Ltd.	ci
Newalls Insulation Co., Ltd.	Aug.
Nipa Laboratories, Ltd.	xcix
Norman Engg., Co.	Oct.
Northern Ireland Distributors, Ltd.	July
Norwood, W., & Sons, Ltd.	civ
Nu-Swift, Ltd.	cxvi
Nutregen, Ltd.	June
Optrex, Ltd.	July
Ormerod Engineers, Ltd.	lxxxvii
Osborne Engineers, Ltd.	lxxxix
Oury, Millar & Co., Ltd.	May
Padley & Venables, Ltd.	Sept.
P.A.M., Ltd.	lxxviii
Palmer, S. J. (N/C), Ltd.	April
Pascall Engineering Co., Ltd.	cxiv
Passburg-Block-Hass G.M.B.H.	cvi
Payne, P. P. & Son, Ltd.	xxxvii
Pearn, Frank, & Co., Ltd.	Mar.
Peerless & Ericsson, Ltd.	xci
Permoglaze, Ltd.	cxx
Permutit Co., Ltd.	xxxv

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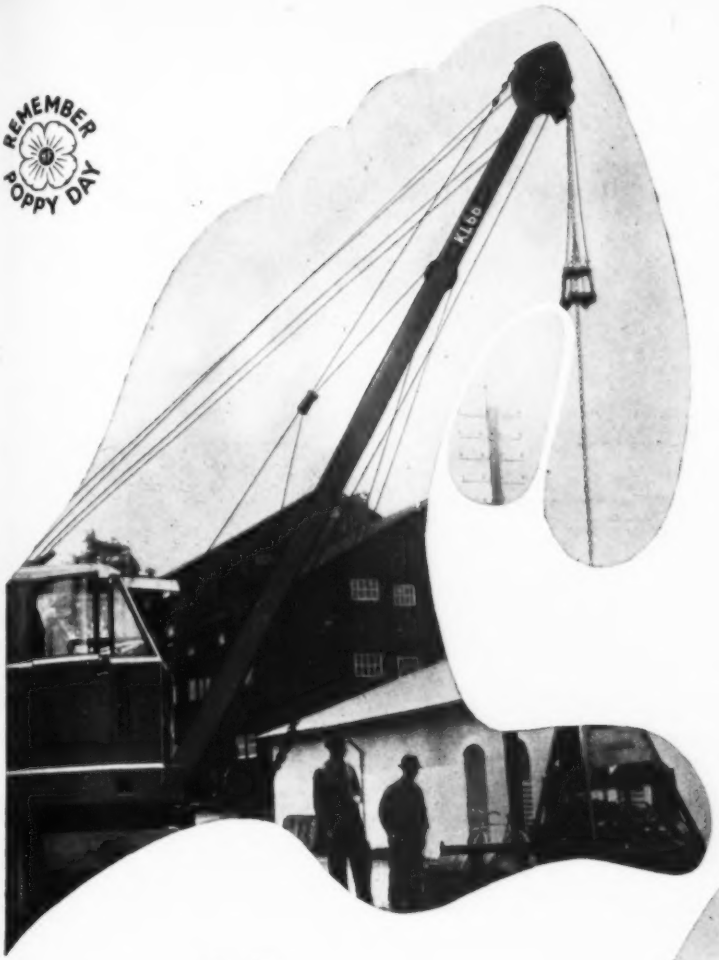

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Index to ADVERTISERS

	Page
Peters, G. D., Ltd.	li
Philips Electrical, Ltd.	Oct.
Pilkington Bros., Ltd.	lxiv
Plenty & Son, Ltd.	civ
Polak & Schwartz, Ltd.	xxi
Pollard Bearings, Ltd.	Oct.
Porteus, G., & Sons, Ltd.	Oct.
Powell & Co.	cxix
Powell Duffryn Carbon Products, Ltd.	lxxvi
Power Jacks, Ltd.	Sept.
Powlings Patent Processes, Ltd.	Jan.
Premier Colloid Mills, Ltd.	vii
Premier Filterpress Co., Ltd.	Oct.
Princeps Chocolate Works	Sept.
Pulsometer Engg. Co., Ltd.	cxx
Purdy Machinery Co., Ltd.	Oct.
Pye, W. G., & Co., Ltd.	lxxi
Quickset Water Sealers, Ltd.	Feb.
Quiz Electrics, Ltd.	Feb.
Q.V.F., Ltd.	Sept.
Ransomes, Sims & Jefferies, Ltd.	Aug.
Rapid Magnetic Machines, Ltd.	Oct.
Rayner & Co., Ltd.	Oct.
Reads, Ltd.	lxxxii
Realm Engineering Works, Ltd.	xc
Reigate Warehouses	Oct.
Roberts, David, & Son	cxvi
Robinson, R., & Co., Ltd.	Mar.
Rotoplunge Pump Co., Ltd.	cii
Rowe Bros., & Co., Ltd.	xcii
Royles, Ltd.	lxxiii
R.T.S.C. Home Sales, Ltd.	Sept.
Rubber Improvements, Ltd.	xiii
Russell Constructions, Ltd.	Aug.

	Page
Samuelson, P., & Co., Ltd.	xcix
Saunders Valve Co., Ltd.	lxxv
Sauven Perforating Machine Co.	xciii
Saxon Engg. Co., Ltd.	cv
Scherer, R. P., Ltd.	Aug.
Sculthorp, R., & Co., Ltd.	July
Semtex, Ltd.	xxxiii
Seyfried, John F., & Sons, Ltd.	cx
S.F.P. (Food Products), Ltd.	cviii
Shell Chemicals, Ltd.	Oct.
Short & Mason, Ltd.	Cover iii
Sieber, James, Ltd.	Jan.
Sigmund Pumps, Ltd.	April
Silber, L. I., & Co., Ltd.	Oct.
Silverson Machines (Sales) Ltd.	Oct.
Simon, Henry, Ltd.	i
Skerman, C., & Co., Ltd.	cxviii
SMALL ADVERTISEMENTS	cxvii-cxix
Small Electric Motors, Ltd.	lxxxix
Soya Foods, Ltd.	Oct.
Spirax-Sarco, Ltd.	xxvii
Standard Synthetics, Ltd.	Jan.
Star Welding Co., The	June
Stelcon (Industrial Floors), Ltd.	lxxix
Stevenson & Howell, Ltd	cvii
Sturge, J. & E., Ltd.	xci
Sturtevant Engineering Co., Ltd.	lxxvii
Tate & Lyle, Ltd.	July
Taylor Rustless Fittings Co., Ltd.	xc
Teleflex Products, Ltd.	lxxiv
Telegraph Construction & Maintenance Co., Ltd.	Oct.
Thames Board Mills Ltd.	Sept.
Thomas Richard, & Baldwins, Ltd.	Sept.
Thompson, John (Dudley), Ltd.	lxxxv
Trapow, D., & Co., Ltd.	lxxvi
Tunnel Glucose Refineries, Ltd.	civ

	Page
Ultrasonics, Ltd.	May
Union Food Machinery Co., Ltd.	lxxxiv
United Glass Bottle Mnfrs., Ltd.	xliv, lvii
United Indigo & Chemical Co., Ltd.	xxx
U.K. Dried Fruit Co., Ltd., The	Nov.
United Steel Companies, Ltd.	Sept.
Universal Metal Products, Ltd.	Oct.
Usines Vermylen S.A.	cii
Valley Products (Lye), Ltd.	Aug.
Venesta, Ltd.	June
Viskase, Ltd.	xi
WAECO, Ltd. (Fumite Division)	Sept.
Walker, Crosweller & Co., Ltd.	lii
Warwick Production Co., Ltd.	xxix
Washington Chemical Co., Ltd.	xxxiv
Watten Emulsifying Machines, Ltd.	Mar.
Webster, Isaac, & Sons, Ltd.	cvi
Weir, G. & J., Ltd.	Oct.
Wetter, J. C., & Co., Ltd.	lxxiv
Wheatly & Co., Ltd.	April
Whiffen & Sons, Ltd.	cii
White, Tomkins & Courage, Ltd.	lx
Whittaker, Arthur	cxvii
Willcox, W. H., & Co., Ltd.	xcii
Williams (Hounslow), Ltd.	Sept.
Wiseman, Alfred, & Co., Ltd.	cx
Worham, Antony, Ltd.	Mar.
Yale & Towne Ltd.	iii
York Shipley, Ltd.	lxv
Yorkshire Engineering & Welding Co. Ltd.	xciii

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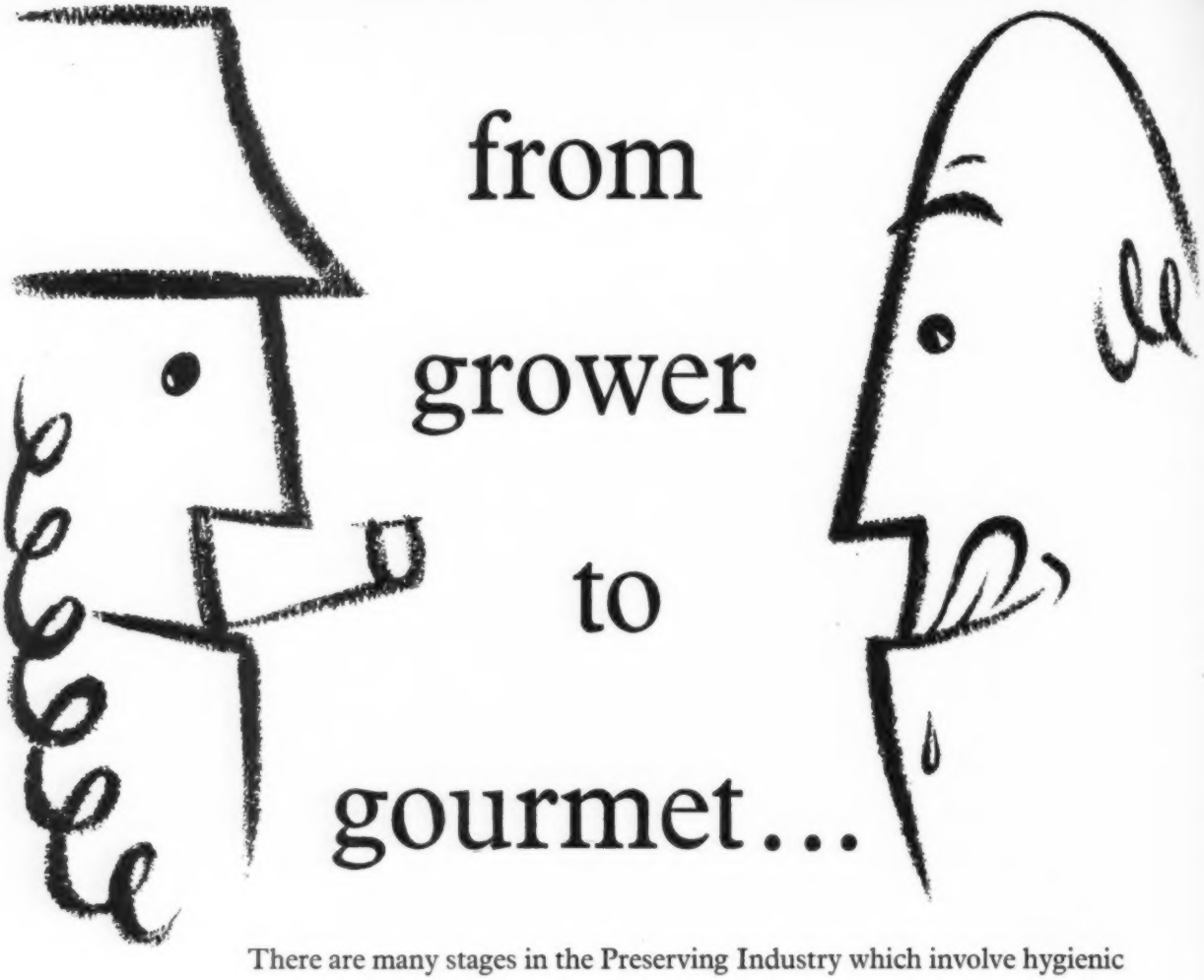

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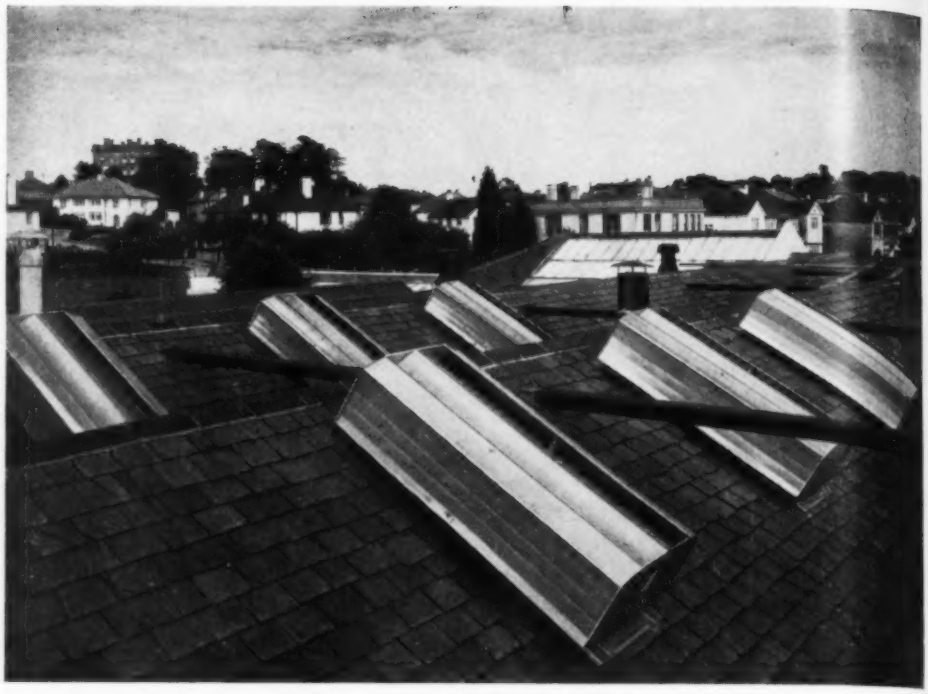

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I'm a Busy Little Bee from G.E.C.

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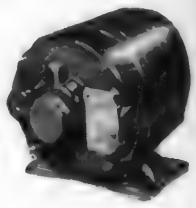

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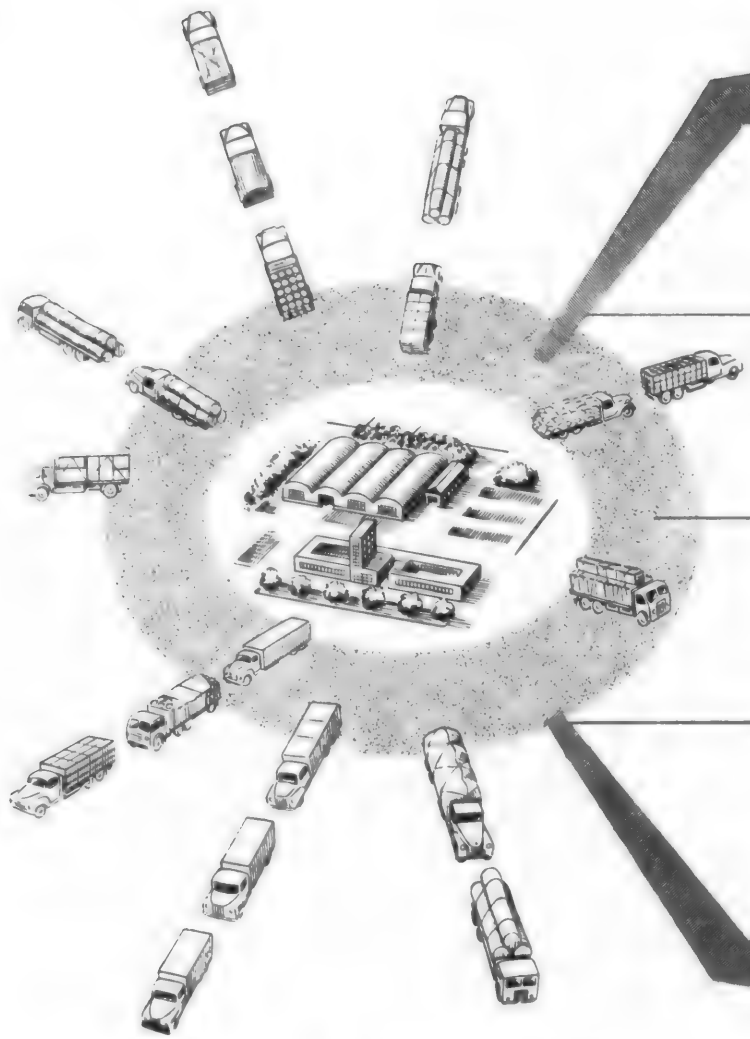

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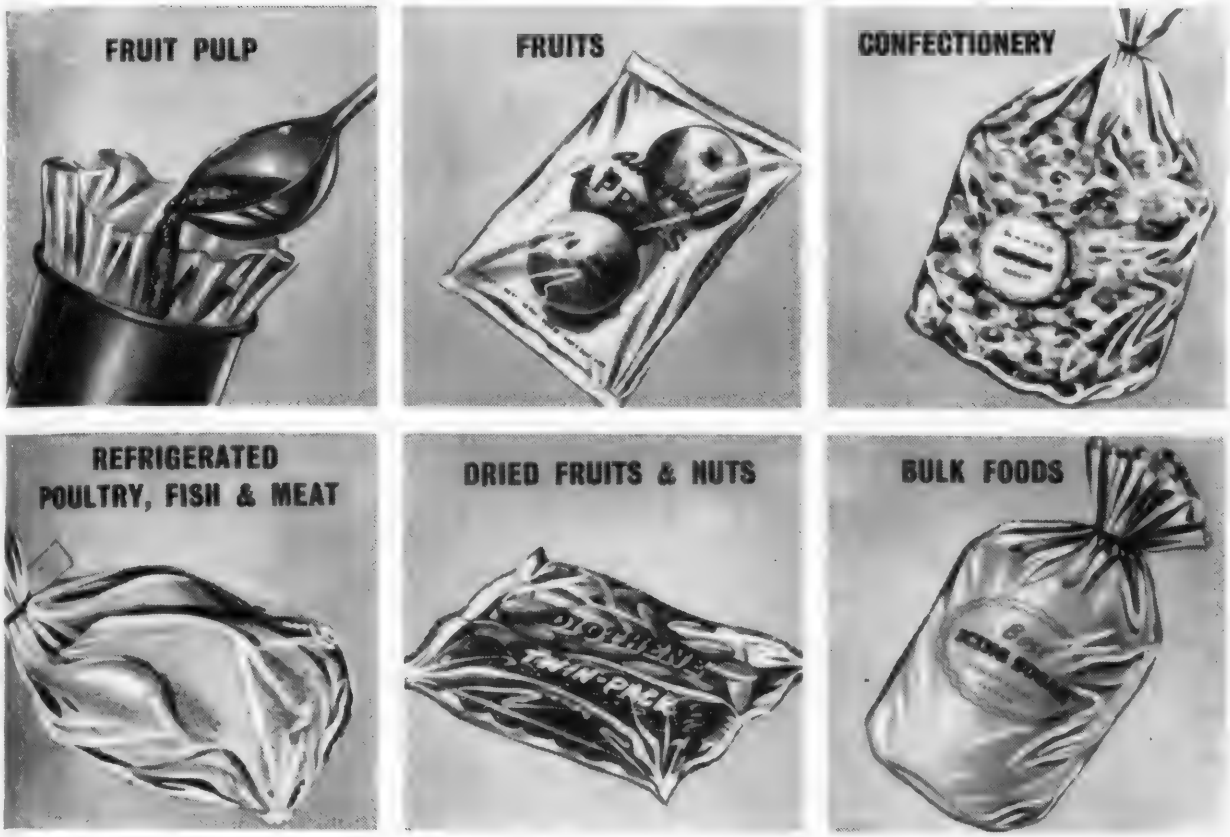
Could Diothene be used

(Polythene)

for your product?



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TOUGH for protection . . . completely HYGIENIC

Diothene is a new, transparent flexible film with outstanding qualities for the packaging of food either in bulk or in packs for the counter. It is tough—does not easily tear or puncture; it is transparent—shows the contents attractively; it is sterile—has no odour, is non-toxic and cannot taint the contents. Diothene is moisture-proof, liquid and sift proof, can be sealed easily and is unaffected in deep-freeze storage. Diothene can be supplied in quite small bags suitable for counter sales or in heavy gauge bags suitable for large quantities.

Flexible Packaging Ltd at their factory at Portsmouth, manufacture the Diothene film, make up bags to exact specifications in any quantities and print in multi-colour—all under one roof.

This service assures prompt deliveries and competitive prices. And because Flexible Packaging Ltd are now a subsidiary of The Metal Box Company, users of Diothene can take advantage of Metal Box design and research facilities—the most extensive in the country covering packaging requirements.

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DIOTHENE WILL KEEP IT CLEAN

THE METAL BOX COMPANY LIMITED

Flexible Packaging Division

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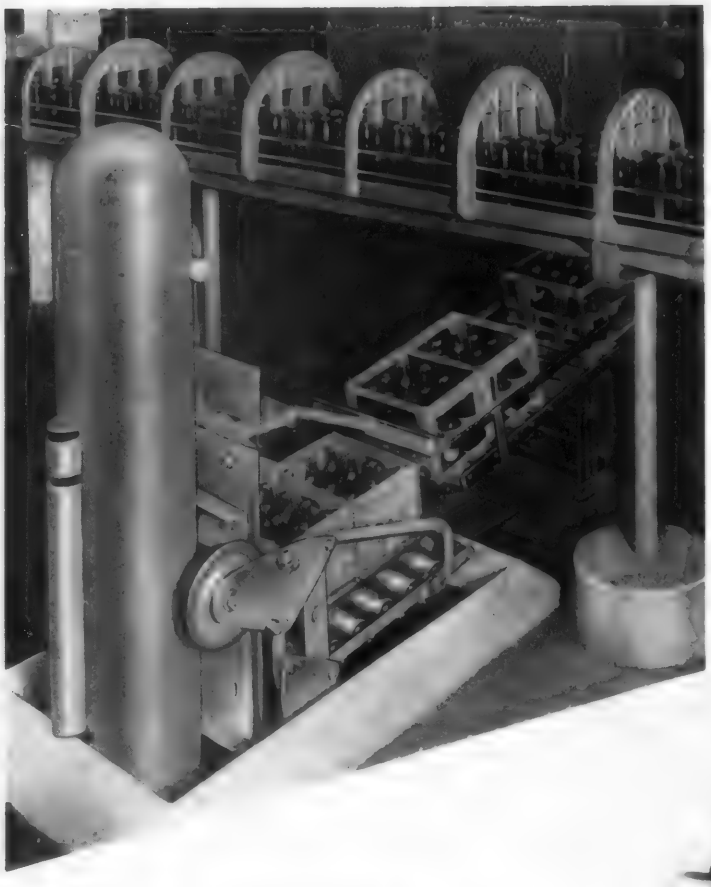

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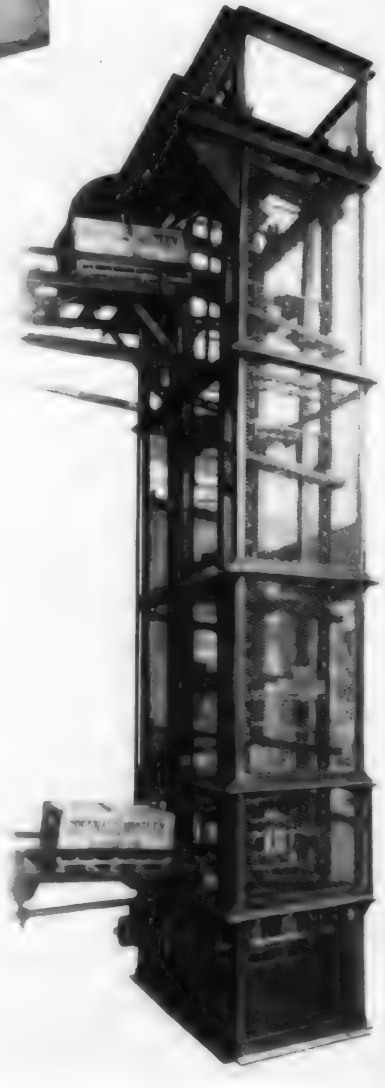
ELEVATORS and LOWERATORS



Aircush Lowerator *(above)*

Occupies as little as 8 sq. ft. of floor space and lowers up to 600 bottle cases per hour from floor to floor **using only Gravity.** Completely shockless in operation with automatic feed and discharge.

Twin Track Lift *(right)*

Requires little floor space and elevates approx. 720 bottle cases an hour with automatic feed and discharge. Has a low feed height and serves any number of floors with intermediate discharge. Discharges on same side as feed or on the opposite side.

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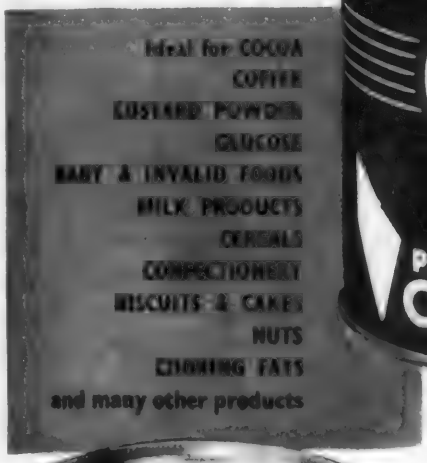

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The Collar Can is precision made and designed for high speed filling and closing operations. It is ideally suited for most types of powders, solids and granulated products that need a hermetic seal to preserve freshness and flavour. An ingenious can proving that in container design and production Metal Box "Know-How" does count!

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'CELLOPHANE'

the first packaging film — and the greatest!

The entry of British Cellophane Limited into the field of transparent packaging marked an era of development which has since brought immeasurable benefits to manufacturers of a wide variety of products in Britain and the world over.

The tremendous success of "Cellophane" with its superlative transparency as a sales medium, rapidly made its use universal, the trade mark a household word and British Cellophane Limited the leading manufacturers of cellulose film in the U.K., in Europe and the Commonwealth.

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"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

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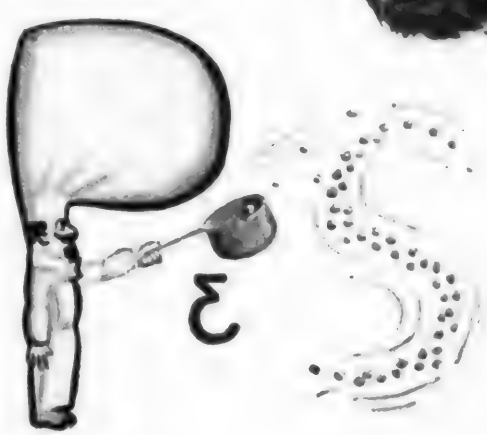

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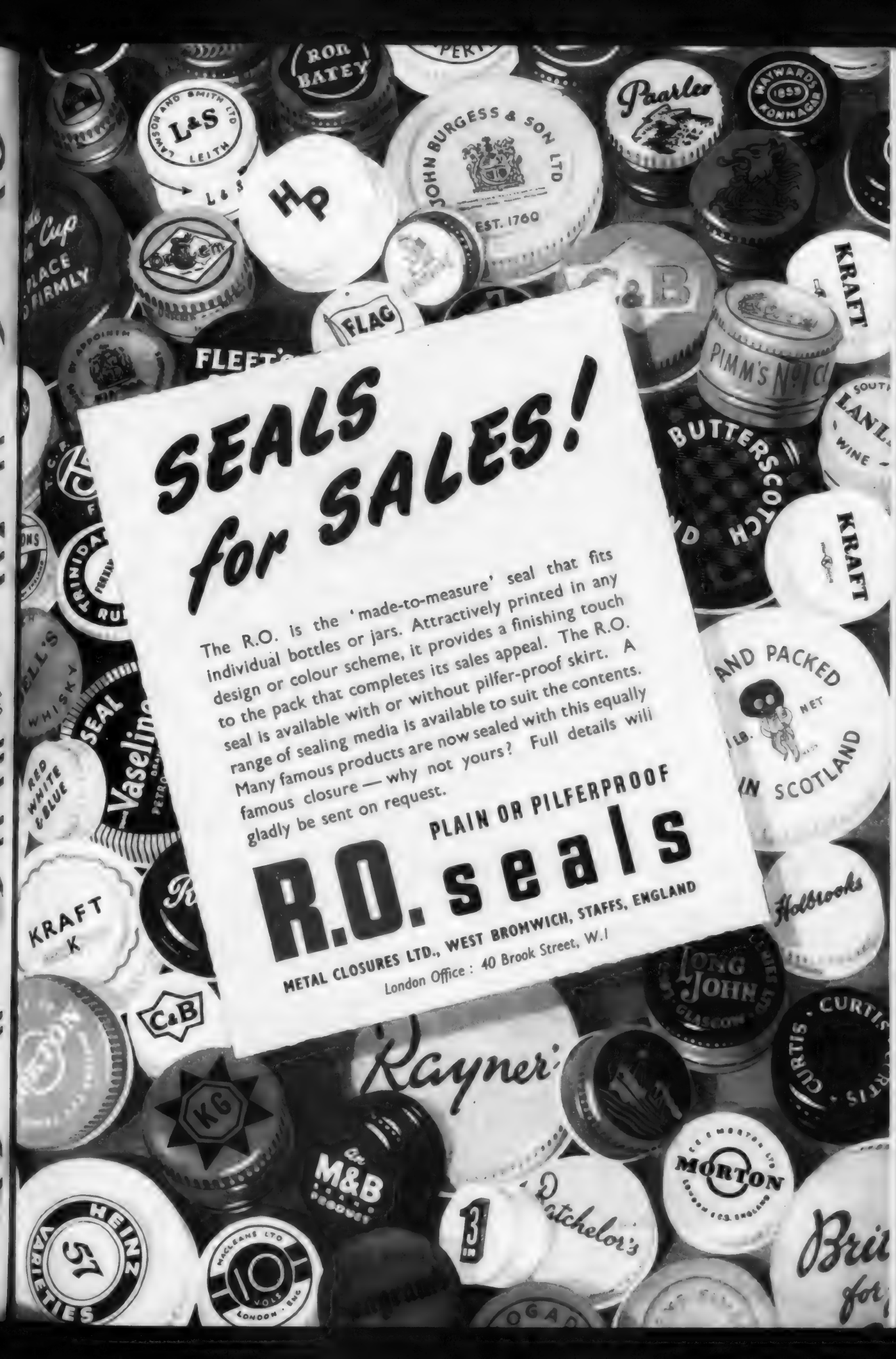
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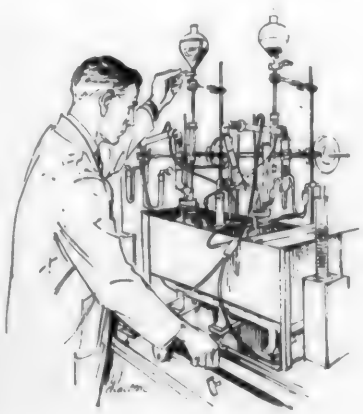

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PHŒNIX HESTON EQUIPMENT CO. LTD. *is the answer*

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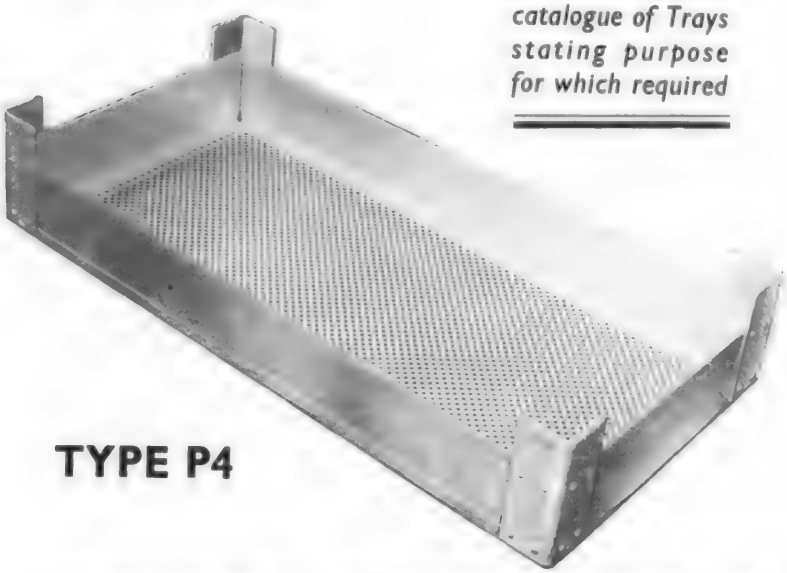

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Q: *Where does the air come from?*
A: When steam is off, air enters through valves, traps, joints, and fills the pipes and the steam spaces of the plant.

Q: *What harm can the air do?*
A: It does a surprising amount of harm. When steam enters the units it condenses, but the air cannot condense. And if it cannot get out, the air does two things; it hangs about as a stagnant film on the inside surfaces, and it mixes with the steam.

Q: *What then?*
A: The film of air puts up a tremendous resistance to the flow of heat from the steam to the process. That reduced heat transfer slows down the job, often seriously. The air that mixes with the steam reduces the effective temperature of the steam.

Q: *Can't the air get out through the steam traps?*
A: Sometimes yes, sometimes no. Some steam traps can cope with air, some cannot. But even using traps that can release air, on many jobs a lot of the air cannot get to the traps anyway. Something else has to be done.

Q: *What else?*
A: You can use hand cocks, but they are hardly ever satisfactory: either a lot of steam is blown to waste or a lot of the air never gets out. The only satisfactory way is to use automatic air vents.

> "Of all the problems that confront the steam user, the removal of air from inside heating surfaces is the most neglected, yet it is one of the most important. . . . Air is the arch enemy in steam and must be removed as rapidly and completely as possible."
>
> - *Oliver Lyle in "The Efficient Use of Steam."*

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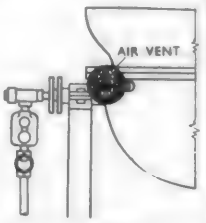
A: The vents automatically open to air but close to steam. On starting up the job, air is released full bore through the vents, giving quicker starting (warming-up times have been halved); the vents open to discharge any air that collects during running. They accelerate heat transfer and improve processing temperatures. They make possible a much better output performance (10 per cent., 15 per cent., even more, according to the particular condition).

Q: *Where can I find out more about automatic air venting?*
A: Send the request slip for the Information Sheet "Air in Steam Spaces" and the Pamphlet describing Spirax Automatic Air Vents.

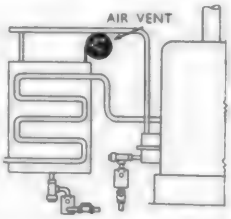
Spirax-Sarco Ltd CHELTENHAM *Phone: Cheltenham 5175-6 Grams: Spirax, Cheltenham*

LONDON OFFICE: *28 Victoria Street, S.W.1. Abbey 6101-3832*

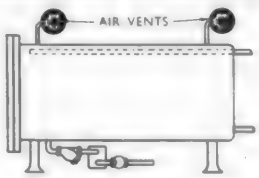
One of the series of Spirax Thermostatic (Automatic) Air Vents.



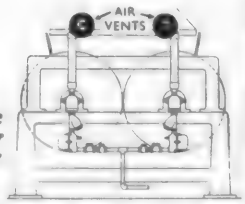
Spirax Automatic Air Vents for steam-jacketed boiling pans.



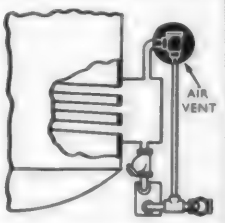
Spirax Automatic Air Vents for stills of various types.



Spirax Automatic Air Vents for retorts and digesters.



Spirax Automatic Air Vents for cylinder drying machines.



Spirax Automatic Air Vents for evaporators of various types.

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Please send Information Sheet "Air in Steam Spaces" and Pamphlet No. 108 on Spirax Automatic Air Vents.

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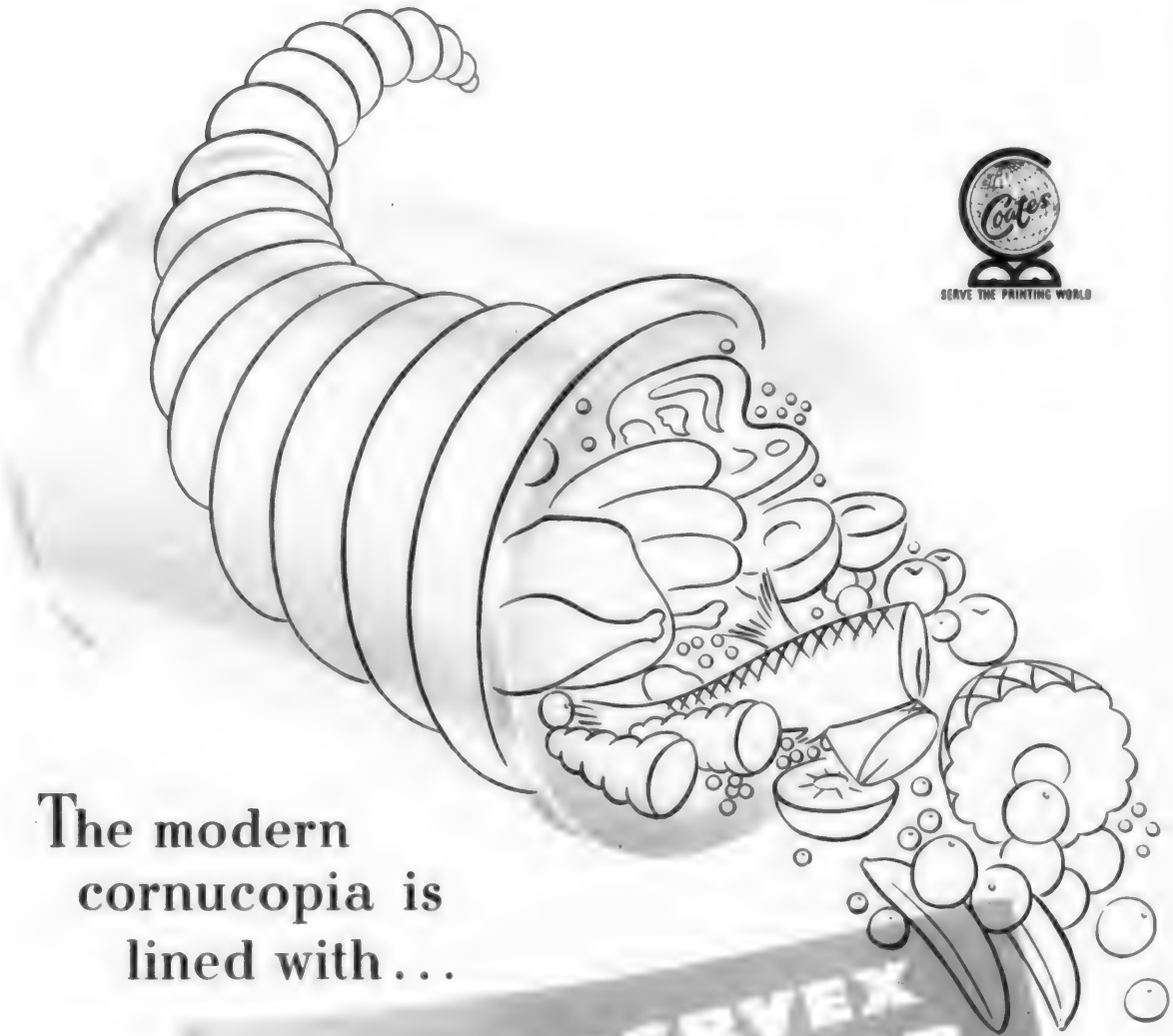

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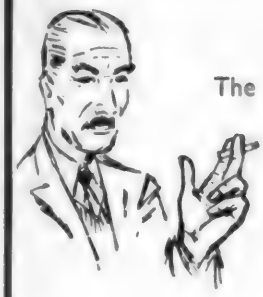

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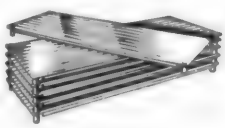

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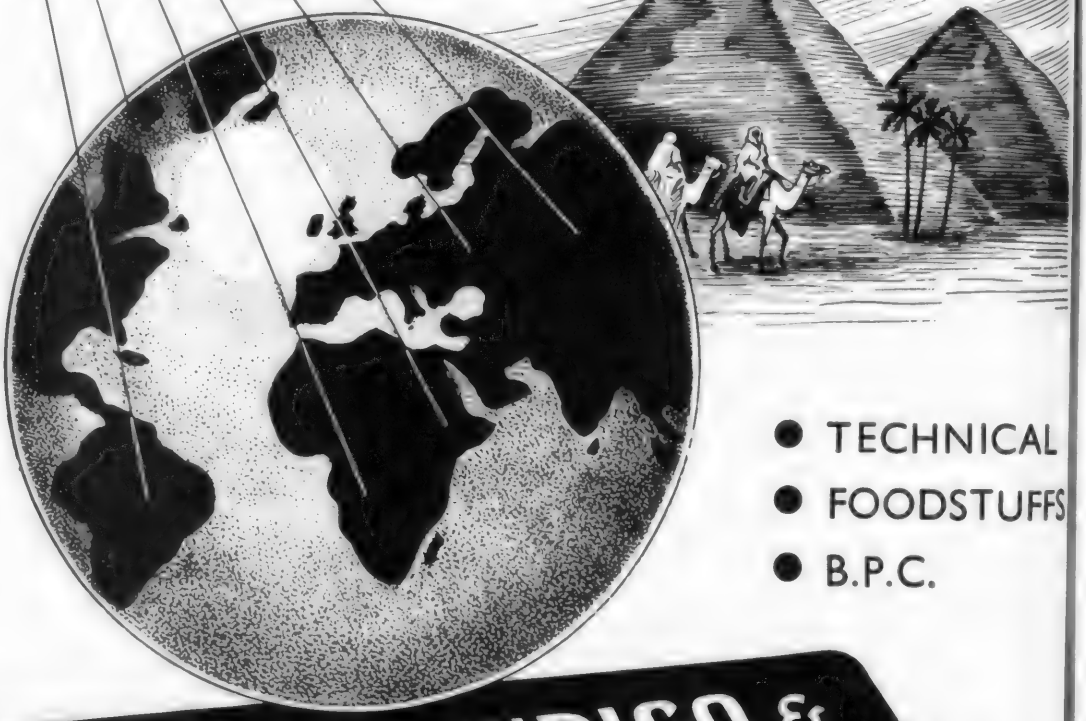

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ALTERNATIVE TYPES
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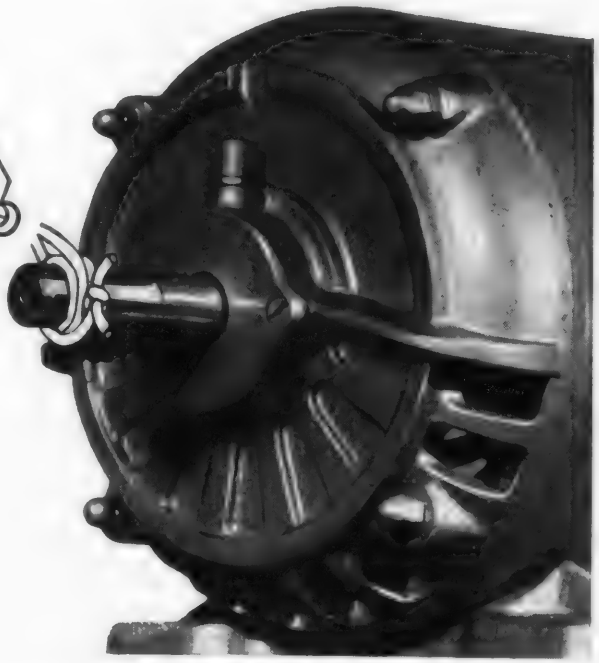

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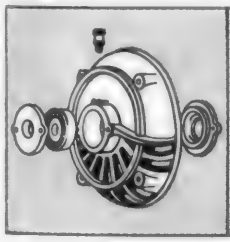
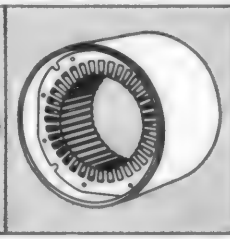
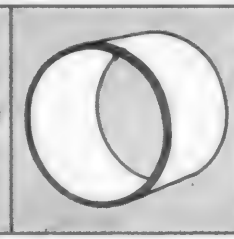
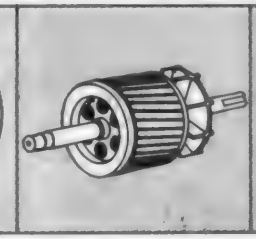
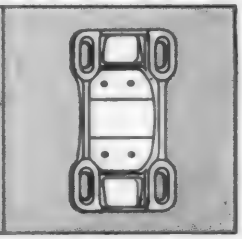
BEARINGS	STAMPINGS	STEEL SHELL	ROTOR	FEET
				
Super silent ball bearings fitted as standard.	Pressure assembled pack ensures a rigid stator winding.	3/16" rolled steel shell makes a stout outer frame.	Pressure cast aluminium rotor, dynamically balanced to give vibration free running.	Accurately machined cast iron feet. Firmly fixed but easily detachable.

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Gang Slitter

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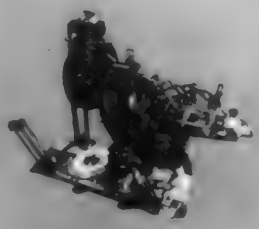
Side Seamer

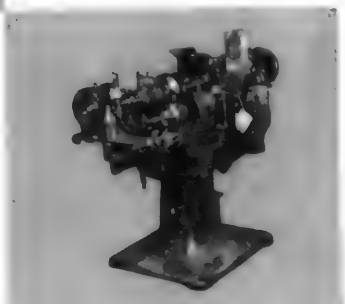


Strip Feed Press

Semi-Auto Seamer

Irregular Body Former

Air Tester



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B.14

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A real "spanner in the works"—that's industrial corrosion. It undermines efficiency as it undermines property. Positive defence against this danger in food factories is provided by Semtex Industrial Division, with its specialised service for the installation of corrosion-resistant floors and structures. In the operation of this service careful selection is made from the range of special compounds which Semtex has available to counter corrosion arising from any conditions—acids, alkalis, heat, damp, and so on.

These materials (linings, membranes, bedding and jointing compounds, and protective paints) are keyed to specific requirements and rightly applied, provide the highest degree of resistance to corrosive attack.

If *you* are concerned about corrosion consult Semtex. The advice and experience of this company are always at your service.

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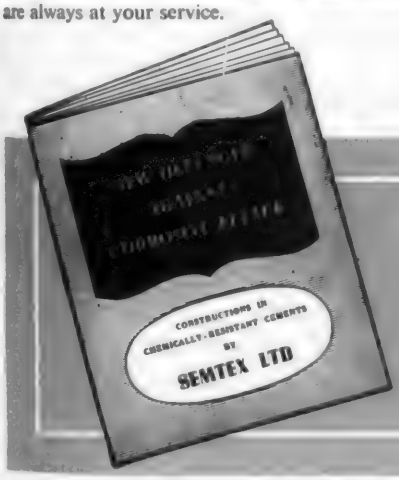
a Dunlop Company



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This photographically illustrated booklet not only describes in detail the full range of Semtex cements but also presents the factors governing the choice of cement for specific types of corrosion-resistant work. Send for a complimentary copy today.

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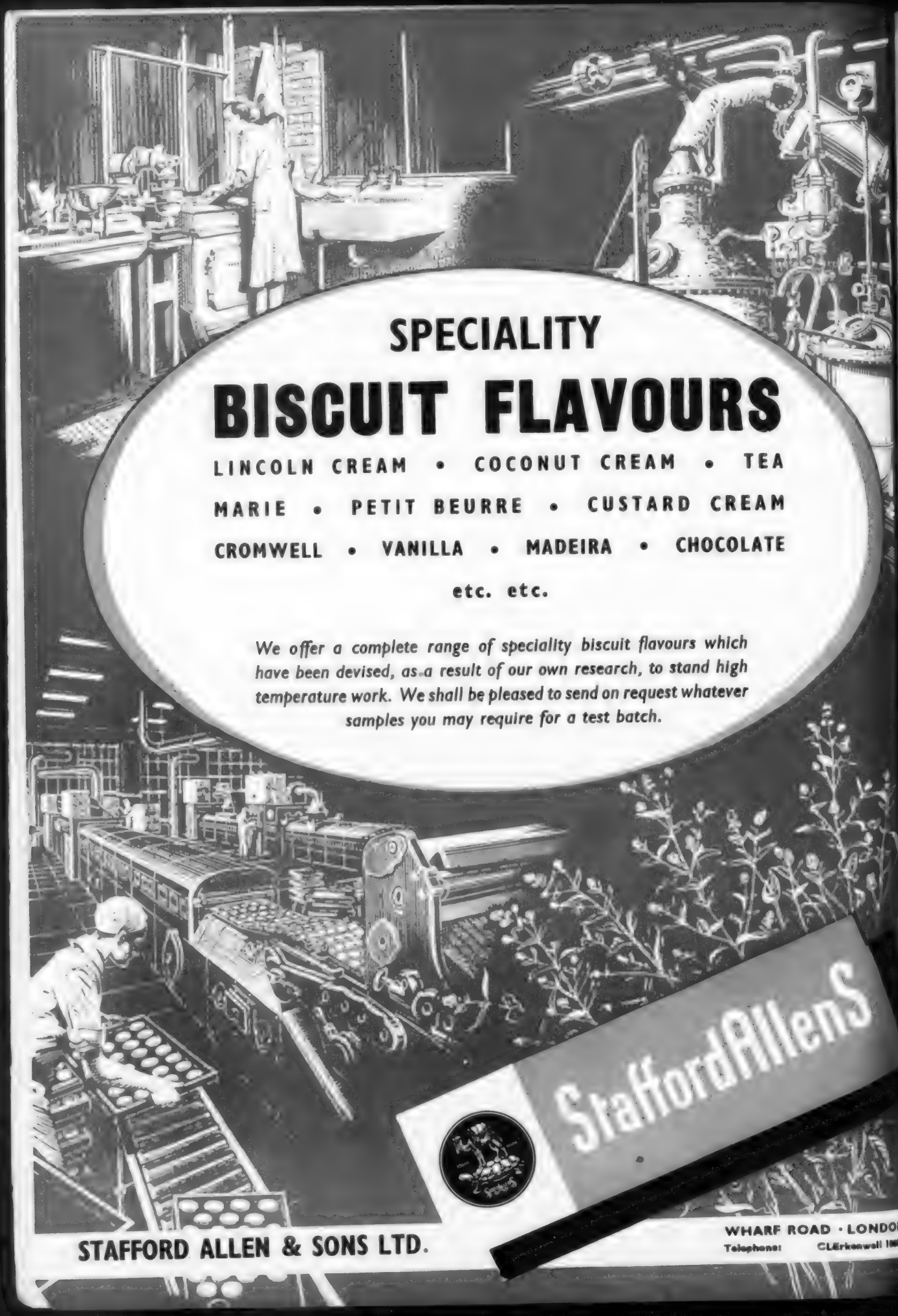
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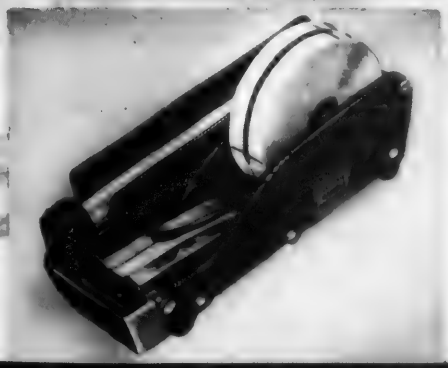

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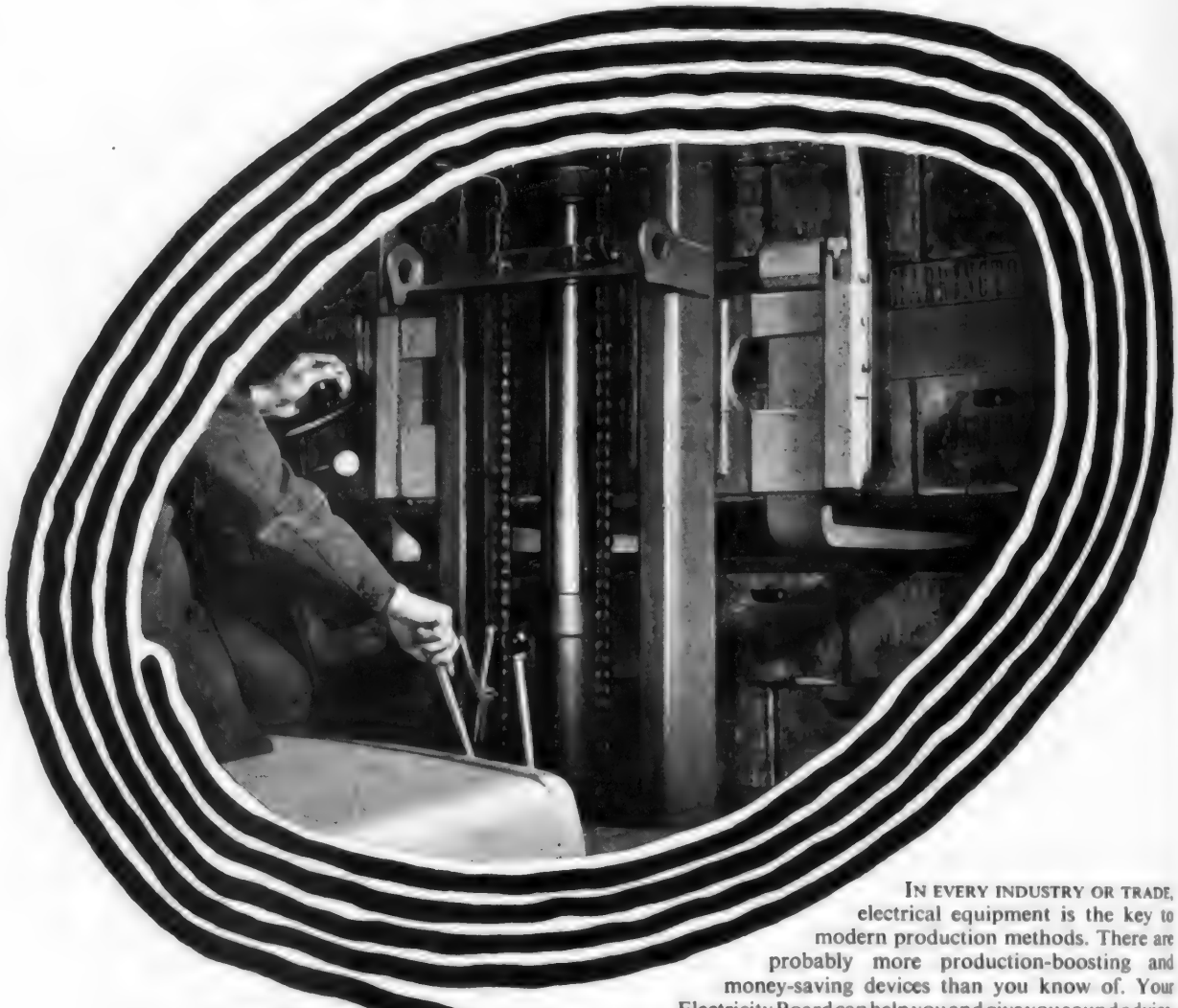
ALL OUR PRODUCTS ARE ON DISPLAY AT THE LONDON SHOWROOMS • VISITORS INVITED

Having a hand in Productivity



Three men's hands

The one hand on the lever is about to make a small movement—and the battery electric fork-lift truck will pick up 36 crates, and take them to the waiting lorry. The electric truck will take the crates quickly, quietly, safely and economically. Without the truck, at least three men would have been needed, and the job would have taken them very much longer. There are electric trucks for handling all kinds of products, from reels of cable to molten steel; easy to drive, long-lived and economical, they speed up production, save time, save labour.

But the electric truck is

only one of the aids to higher Productivity that Electricity can bring you.

IN EVERY INDUSTRY OR TRADE, electrical equipment is the key to modern production methods. There are probably more production-boosting and money-saving devices than you know of. Your Electricity Board can help you and give you sound advice.

They can also make available to you, on free loan, several films on the uses of electricity in Industry—produced by the Electrical Development Association.

E.D.A. are publishing a series of books on "Electricity and Productivity". Four titles are available at the moment; they deal with Higher Production, Lighting, Materials Handling and Resistance Heating. The books are 8/6 each (9/- post free) and the Electricity Boards (or E.D.A. themselves) can supply you.

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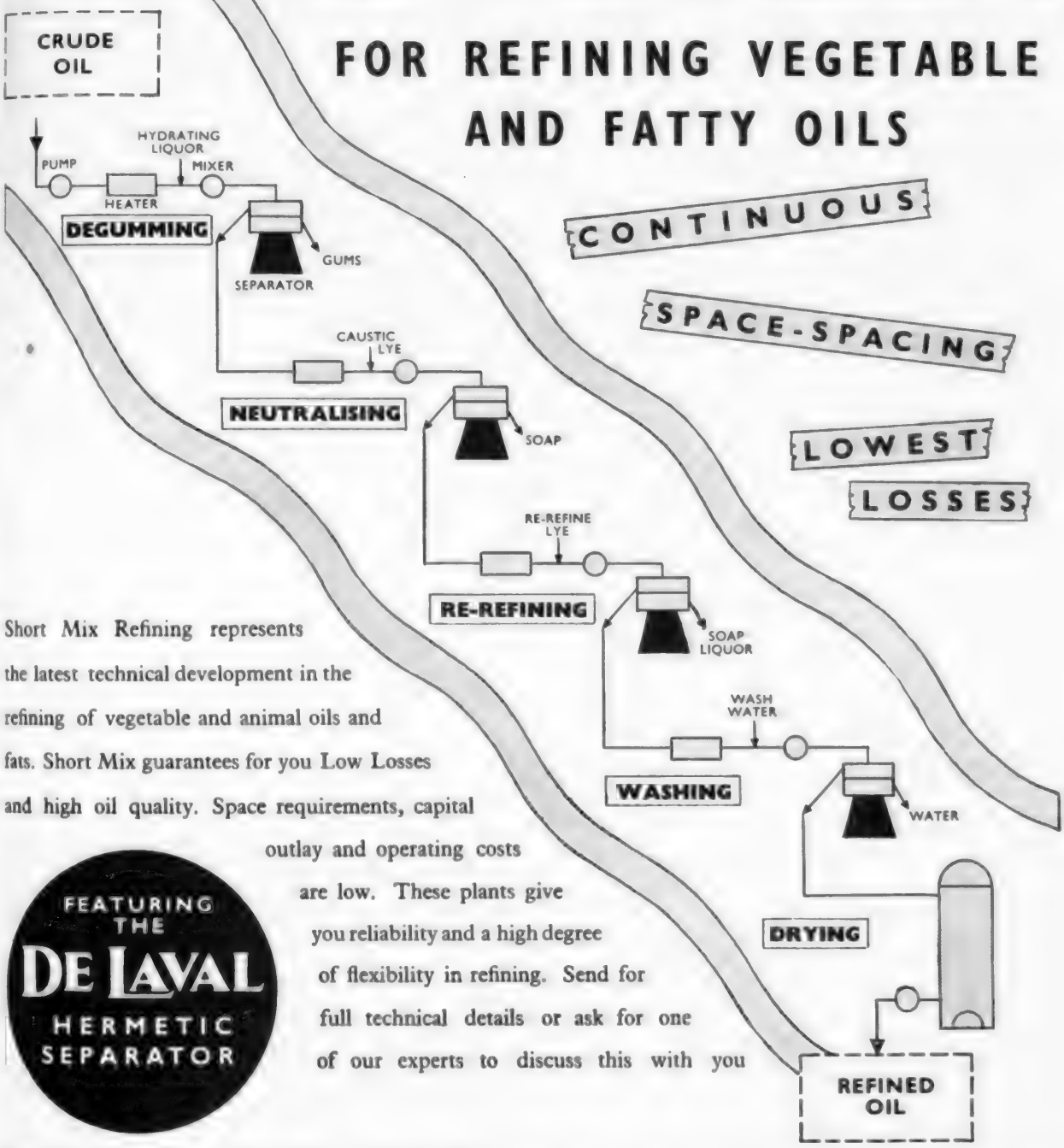

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BOWATERS PACKAGIN

Background to Quality

THE PRICE OF QUALITY is constant vigilance. At Bowaters that vigilance is applied to every stage of production and, before that, to the materials themselves long before they become the papers and boards that are converted in the Bowater factories to serve commerce and industry as sacks, drums, corrugated cases, wrappers and bags.

Quality control begins in the Bowater forests—in Scandinavia, Newfoundland and, now, the United States. Insect pests, bacteria and fungi, which attack the trees and could render them unfit for paper making, are studied, tracked down and eliminated.

And at every stage of the conversion of pulp into paper this scientific control continues. It does not end until the final container or wrapping material has left the factory to serve the manufacturer, the retailer and the public.

But if quality control is important, a wide-ranging, fundamental research programme is vital to the development of new and better packaging products. At Bowaters Central Research Laboratories in Gravesend a team of scientists is constantly working to improve manufacturing methods and processes ; to increase the efficiency of Bowater products ; and to develop them to answer new needs.

The C.R.L. people are in continual touch with the resident scientific staffs in all the Bowater mills and factories. Between them they supply a constant flow of fresh knowledge to the main river of production.

These hidden resources of the Bowater Organisation are as important to the purchaser as they are to Bowaters. The tough sack, the drum, the corrugated fibreboard case and those endless miles of paper bags and waxed papers all owe their quality and performance to the men and women behind the scenes. Bowater scientists are not the absent-minded professors of fiction, they are people with a purpose. And that purpose is to ensure a product of first-class quality at the lowest price possible for the degree of protection required.

Some examples of how that purpose is achieved are given in these pages.

WVP TRIO

RESEARCH played a big part in the actual development of Bowaters fibre drums. Nowadays it concerns itself mostly with testing and improving the protection which the drums offer.

Moisture penetration is one of the dangers from which drum-packed products must be protected and the water vapour permeability (Bowater scientists know it more familiarly as WVP) of different barrier materials is under constant study.

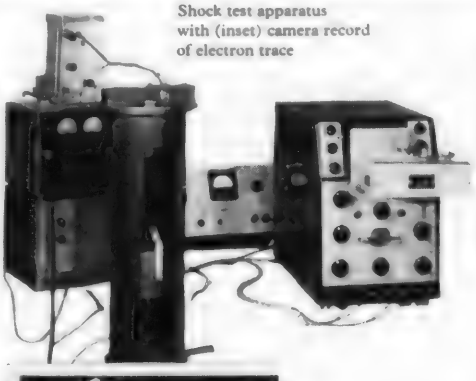
There are three main tests for WVP, all basically simple but all meticulously controlled to give the information required.

In the first test, the barrier material is stretched and sealed over a dish containing calcium chloride. The amount of moisture absorbed by the calcium chloride from the atmosphere over a given period of time is measured by weighing and the WVP of the material thus determined.

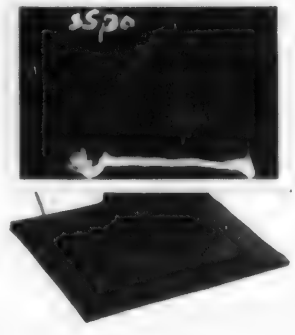
In the second test, calcium chloride is placed inside a complete drum with barrier. Drum and contents are placed in a humidity cabinet and weighed at regular intervals to determine the degree and rate of WVP.

The final test introduces the product which the drum is planned to protect. The drum is filled and placed in a humidity cabinet. The conditions of humidity can be controlled to give the effect of long exposure in a matter of hours. Thus, package performance is matched to product need.

WVP research is, of course, only part of the story. For a great deal of varied research, testing and development has gone into the drums that today answer so many transport and storage problems for so many valuable products.



Shock test apparatus with (inset) camera record of electron trace



Stand No. 8, Bow
Empire Hall

SHOCK

THE POPULARITY of the multiwall paper sack is great and constantly growing. As manufacturers find more and more uses for this tough, economical carrier the laboratory people at Bowaters keep at the task of maintaining and, wherever possible, improving quality.

Samples of all papers developed for sack manufacture are subjected to the special Bowater

ULLETIN

Should you require information about, advice on or supplies of . . .

Ordeal by needle

SIMPLE METHODS often produce remarkable results. In making the waxed papers for which Bowaters are famous, many precautions are taken to achieve just the right blend of protective wax. To test its flexibility, for example, a simple apparatus presses a needle on to a sample of wax. The needle is attached to a pointer which records on a scale the depth of penetration achieved.

This test helps to determine a number of properties affecting the use of waxed paper in practice. For example, a too brittle wax will tend to crack, a too soft wax will cause stacked paper to 'block', i.e. to stick together. Simple but effective tests such as this bring the close control of research to the practical business of manufacture.

Careful control of all stages of manufacture ensures that Bowaters waxed papers give the reliable protection which is absolutely vital to goods which must be as crisp, tasty and fresh when they are bought as when they were made. Moisture, contamination and odours are the enemies against which Bowaters waxed papers are a dependable defence. And this is one of the reasons why.

Wax content

TO ASSESS the wax content of waxed paper the back-room boys of Bowaters use a piece of apparatus called the Soxhlet Extractor. Looking and working rather like an extravagant coffee percolator, it circulates a hot solvent through and through a sample of waxed paper until all the wax has been dissolved. By evaporating the solvent and weighing the residue, the wax content is determined.

One of the reasons why so much care is taken at every stage of manufacture of waxed, and, indeed, every other kind of paper made by Bowaters is that the degree of protection required by different goods varies. Painstaking research and control work ensures that Bowaters' customer gets the right protection for his goods at the right cost.

Bowaters waxed paper may appear in the guise of carton liners, colourfully printed overwraps, and protective bags. Or, for more complex products requiring greater protection from grease and other forms of noxious penetration, there are Bowaters waxed laminated bags. Bowaters work in close co-operation with manufacturers to provide tailor-made answers to specific requirements. They will work closely with you, should you wish.

ACTICS

ck test. The paper is hung
m a high-tension steel rod.
lling weight produces a shock
l. The paper stretches and
n breaks—*but, before it does*
the steel rod has also stretched.
e whole thing happens in milli-
onds. Specially built con-
sers measure the amount of
load by the extension of the
l rod and the extent to which
paper has stretched at the moment of breaking. The actual movements are minute and are shown by the deflection of a beam of electrons on a tiny television tube. Cameras record the trace and so enable the research workers to produce a load extension graph for each paper tested.

"Interesting," says the sender of goods by sack, "but what has it to do with me?"

Simply this. Bowaters multiwall sacks are used by industry to package a vast number of powdered, granular and crystalline products. These sacks travel all over the country—and overseas—and are subject to inevitable shocks and strains in handling and transport. They have to be strong enough to stand up to rough treatment. This test reproduces the effects of the roughest of rough treatment and provides valuable data for the scientists in their search for stronger papers...and thus tougher sacks for industry.

FIBRE DRUMS

for home or export use in the safe transport of chemical powders, foodstuffs, creams, lampshades, hose pipes, cellulose film, brake linings and many other difficult or expensive products

MULTIWALL SACKS

in as many plies, with as many protective properties, as you need for the safe conduct of chemicals, feeding stuffs, fertilisers, foodstuffs, or ground rock products

FIBRE CONTAINERS

in the form of cases, trays, boxes and component fittings for packing any mass-produced product for the journey from factory to point-of-sale

PAPER BAGS

made of white or brown paper, greaseproof, glassine or cellulose film for purposes which can only be described as legion

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Printed or plain, heat sealing or dry waxed wrappers for bread, cake, biscuits, confectionery; not to mention pure waxed kraft for export packing, case lining and other heavy-duty wrapping jobs—

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for the bacon curer

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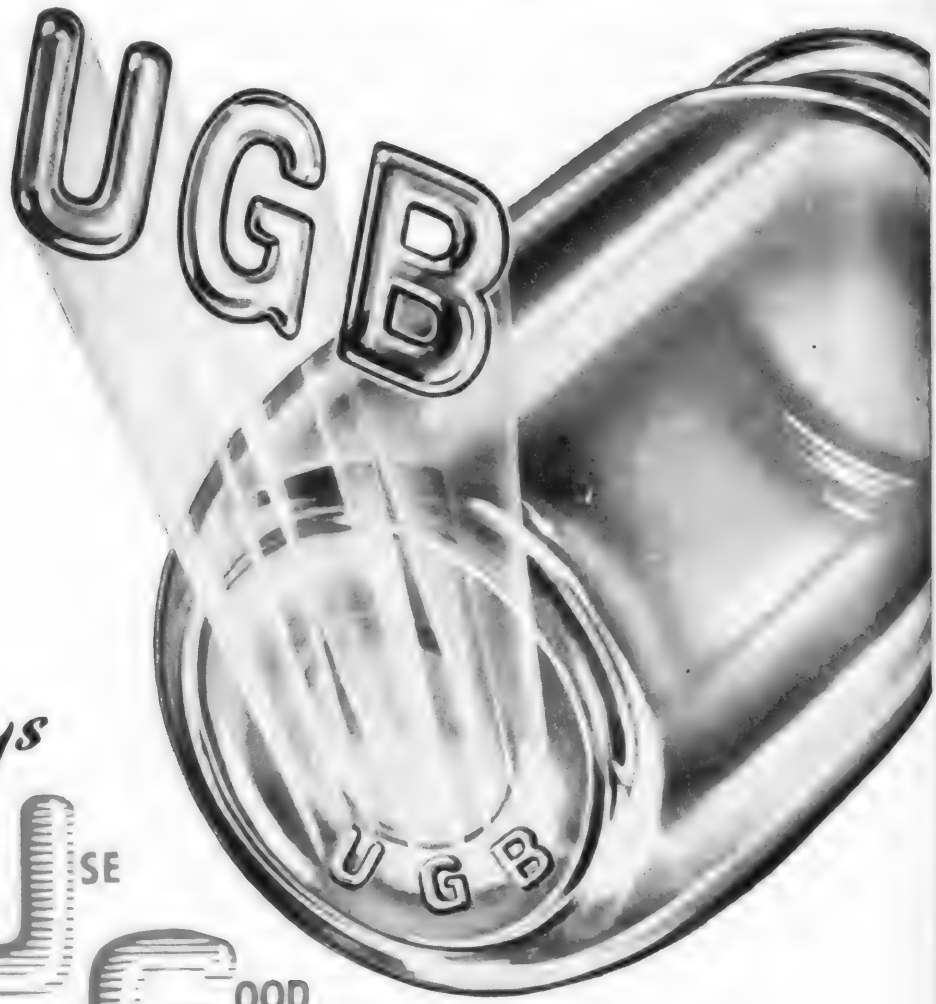
Initials that mean so much in glass



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'Buflovak' Evaporators

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"BUFLOVAK" Stainless Steel Food Product Evaporators set new standards in profitable production of highest quality concentrated food products with natural flavour, good colour, smooth uniform texture, and good body. They are manufactured in types and capacities to meet all requirements and their efficient operation is maintained with minimum supervision, whilst cleaning and sterilizing are easy, thorough and positive.

Right: BLAW KNOX Stainless Steel Double Effect EVAPORATOR INSTALLATION for food products.

Above: Upper chamber and heating tubes, showing complete accessibility for cleaning when the hinged cover is swung open.

LET'S TALK IT OVER

Why not discuss your processing problems with Blaw Knox Chemical Engineers? They will be pleased to confer with you.

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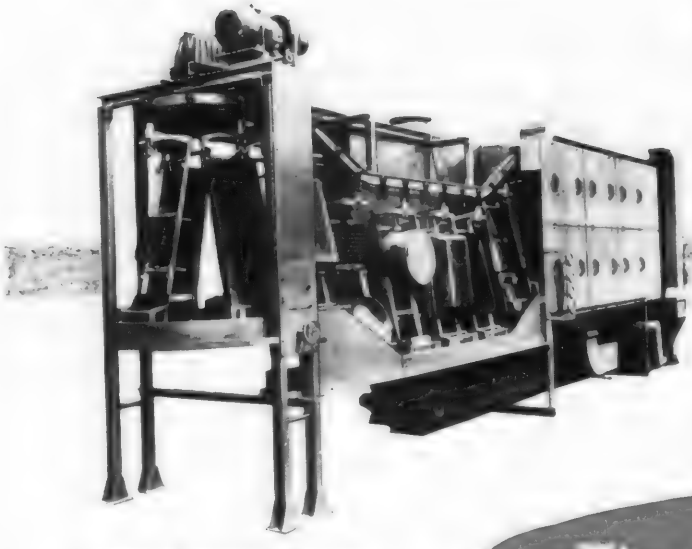
BK128

WASH

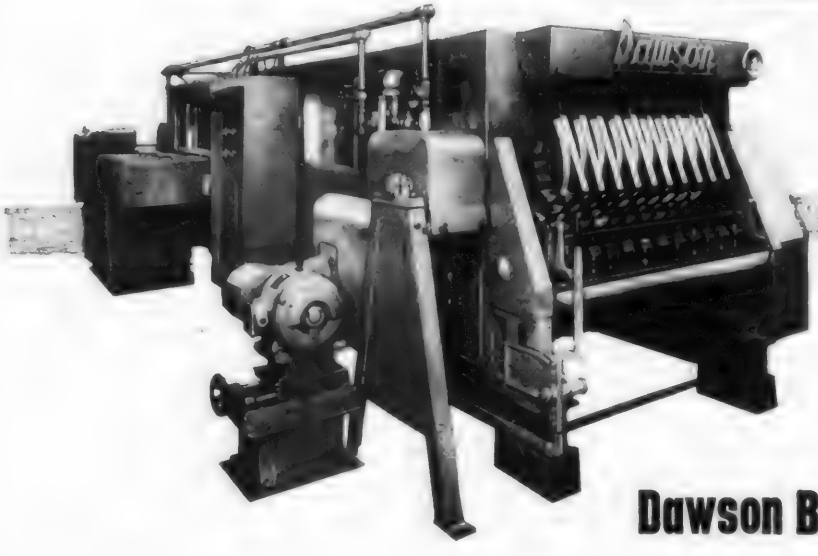


A monorail machine for washing, rinsing and drying varied Food Utensils.

Small machine for washing, and rinsing Bakers' Trays.

ESTABLISHED 1864

The Quick, Economical
Dawson
Hygienic way

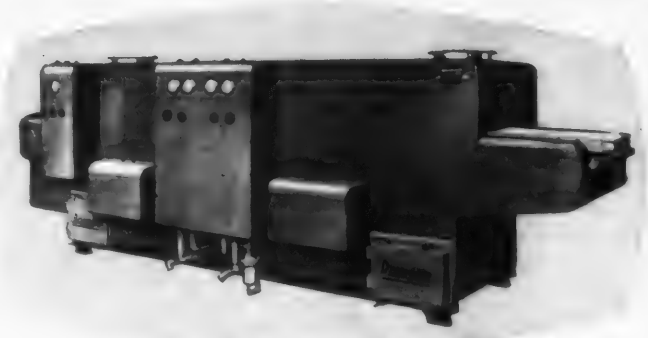


A Bottle and Jam Jar washing, de-labelling, rinsing and sterilising machine.

Tel.: Cleckheaton 1080 (5 lines)

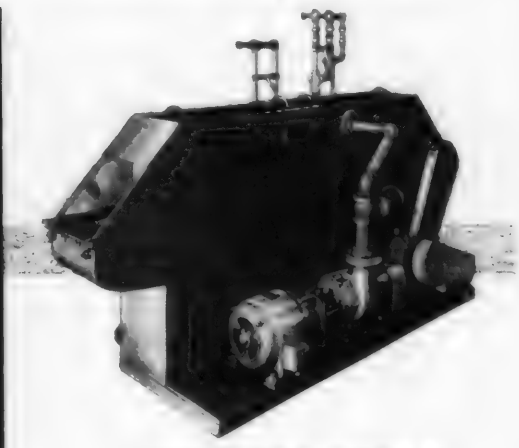
Dawson Bros. Ltd., Gomersal, Nr. LEED

CLEAN



Washes, rinses and sterilises 200—300 trays per hour.

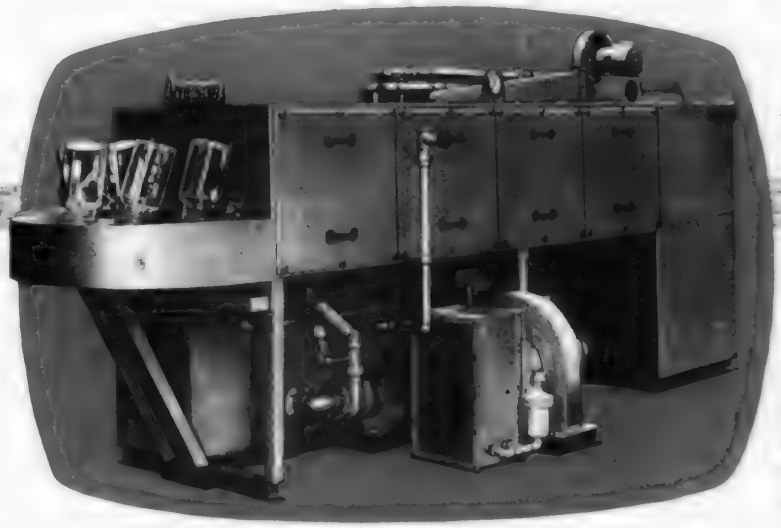
For washing and de-labelling and drying biscuit tins and lids. Capacity 2,000 per hour.



Small Can Washer and Rinser for 30—60 cans per minute.

Make sure that every type of container and utensil used in the manufacture of Food Products is clean, sterile and satisfies Health Regulations.

Dawson washing plant is used extensively today by manufacturers of all types of Food products. Whatever the size or shape of tin, can, tray, jar, bottle, container, mould or food utensil Dawson machines will wash and dry these articles in the minimum time for the lowest cost. Let us know what you have to clean and we shall be pleased to advise you.



A Rotary Jar and Tin washing and drying machine. Capacity 150 per hour.

London Office:
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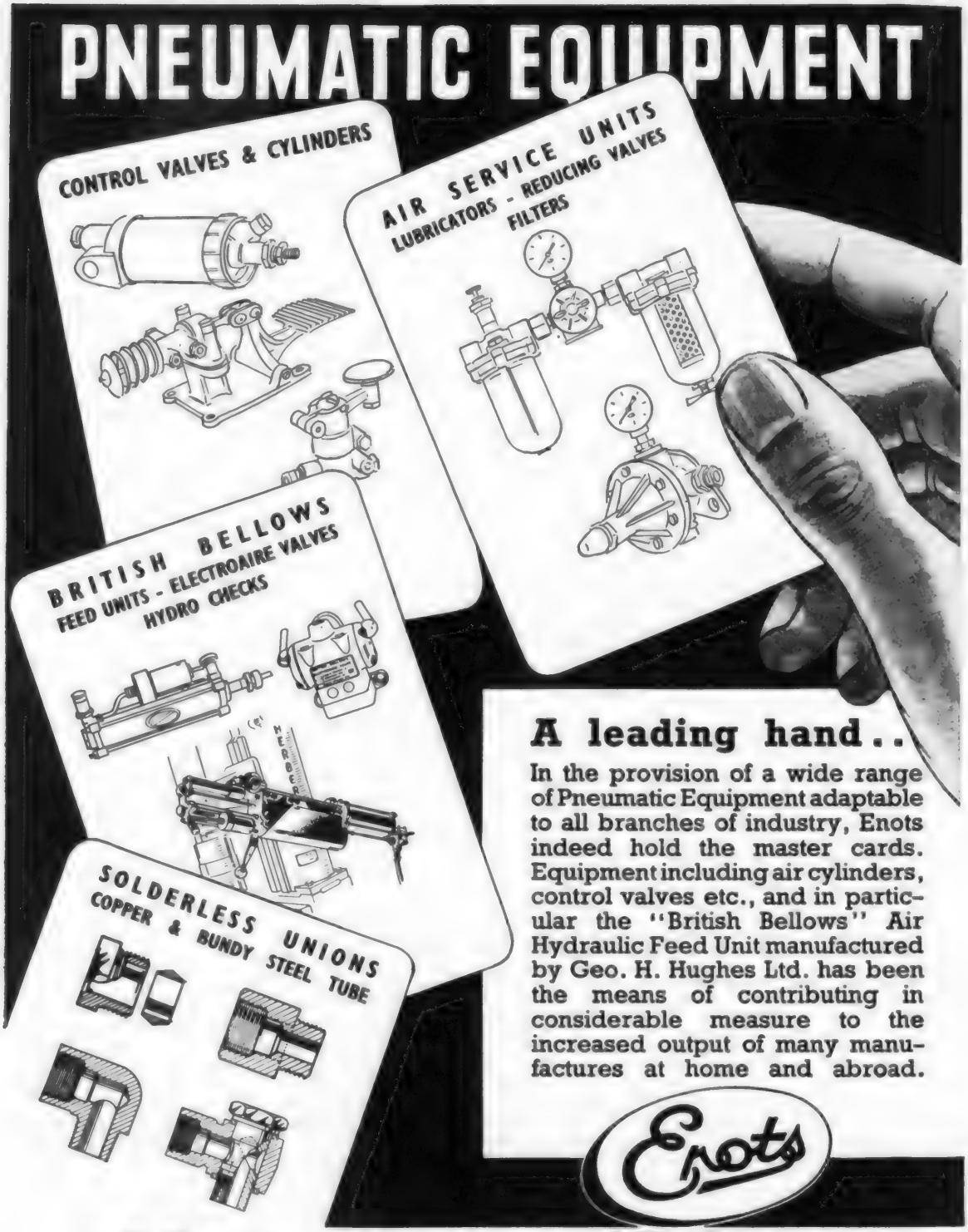
Tel.: Wanstead 7777 (4 lines)

PNEUMATIC EQUIPMENT



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In the provision of a wide range of Pneumatic Equipment adaptable to all branches of industry, Enots indeed hold the master cards. Equipment including air cylinders, control valves etc., and in particular the "British Bellows" Air Hydraulic Feed Unit manufactured by Geo. H. Hughes Ltd. has been the means of contributing in considerable measure to the increased output of many manufactures at home and abroad.

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aids to greater efficiency

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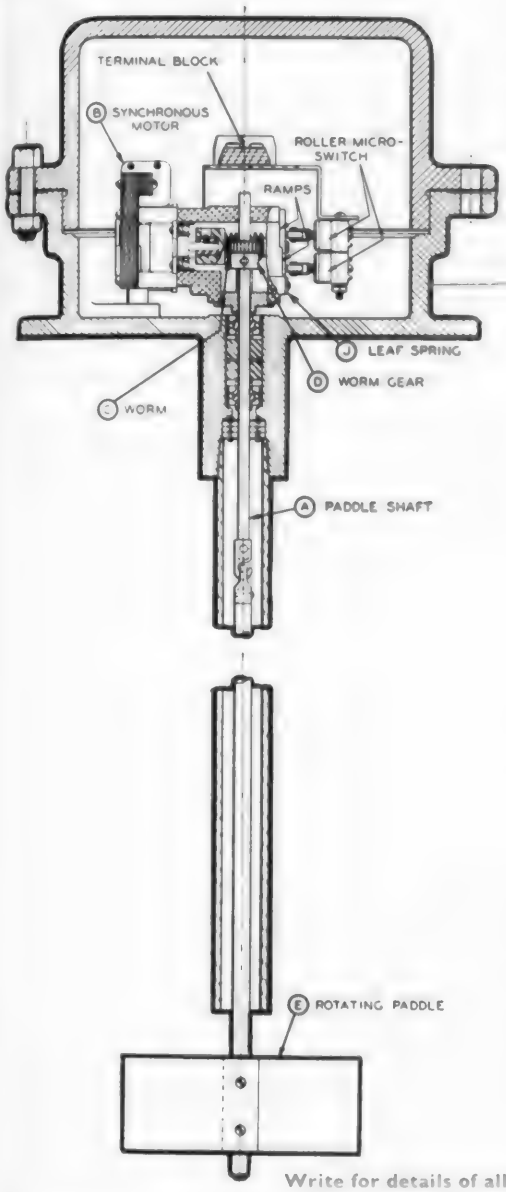
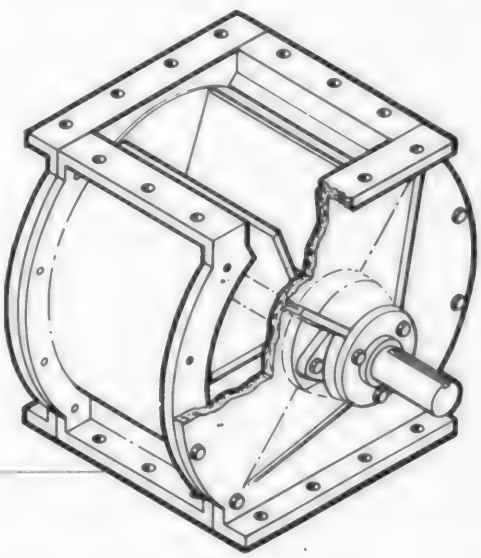
THE FULLER MATERIAL-LEVEL INDICATOR is used to indicate or control the level of dry pulverized, fine, crushed and granular materials passing into or out of a bin, silo, or bunker; or through a conveyor, spout, or similiar device. It may be used to control or operate such equipment as a valve, elevator, conveyor or a feeder (below) by starting or stopping the motor driving the equipment, when a predetermined material level is reached. It is not effected by a momentary surge of material in a bin, neither will it give a false indication by the settling of an aerated pulverized material.





THE FULLER VANE-TYPE FEEDERS for handling pulverized and granular materials are employed wherever controlled flow and discharge of materials from bins, silos, etc., is required. They may be used as air locks for positive or negative pressure differentials and are available in capacity ranges to meet normal plant requirements and are built with circular or rectangular outlets.

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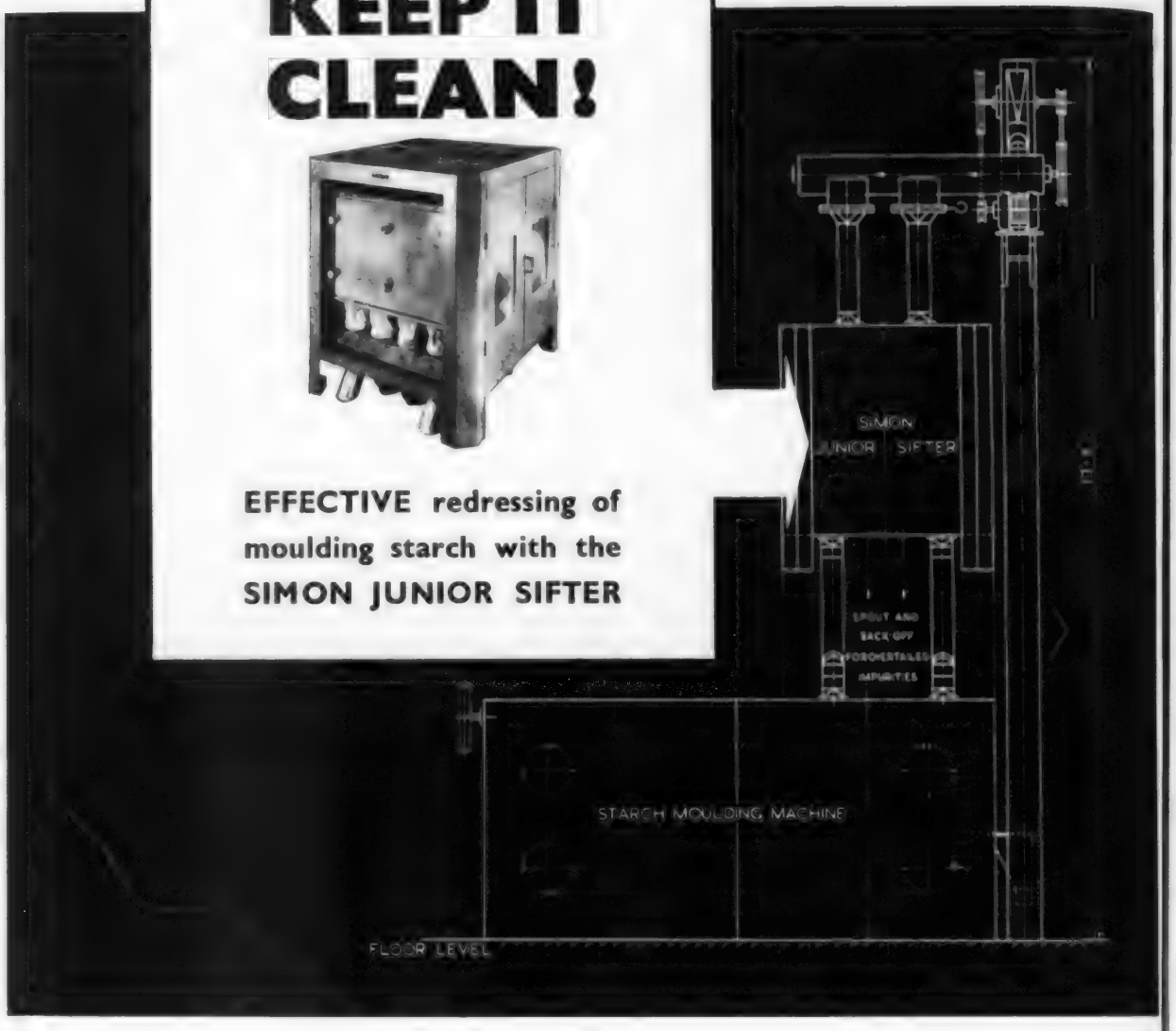
Sole licensees of Fuller Co., Catasauqua, Pa., U.S.A., for manufacture and sale of Fuller equipment in Great Britain.

KEEP IT CLEAN!

EFFECTIVE redressing of moulding starch with the SIMON JUNIOR SIFTER



Pure, clean, well-shaped products come only from starch moulds which are free from impurities. The positive but gentle rotary motion of the flat sieves in the Simon Junior Sifter provides the only satisfactory method of separating splinters, bristles and fragments of confection from moulding starch. And the Junior Sifter does not disintegrate the fragments so that they pass through the sieve and agglomerate again in the starch.

Without loss of production, one Junior Sifter cleans up to 3,000 lbs. of starch an hour. The starch is aerated during the process, resulting in a more even distribution of moisture and cleaner printing.

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- *Less than 4 feet square, it takes up little floor space.*
- *Low power consumption from ½ h.p. motor.*
- *Non-corroding trays.*

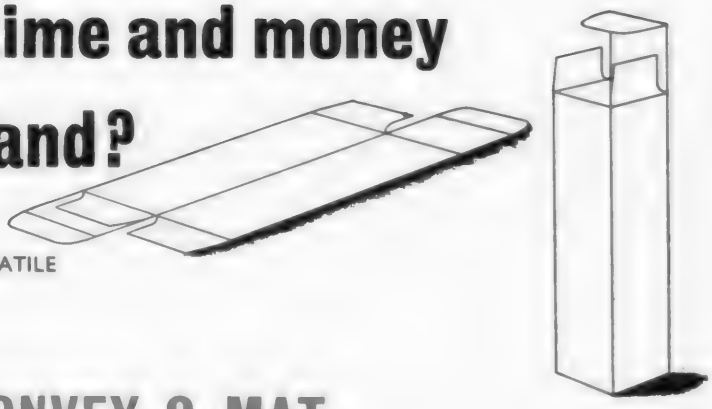
Industrial plant by Henry Simon Ltd

SIMON ENGINEERING GROUP

STOCKPORT, ENGLAND

HS 156

Are YOU wasting time and money doing this by hand?



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- Mounted on rubber wheels—one person can move it.
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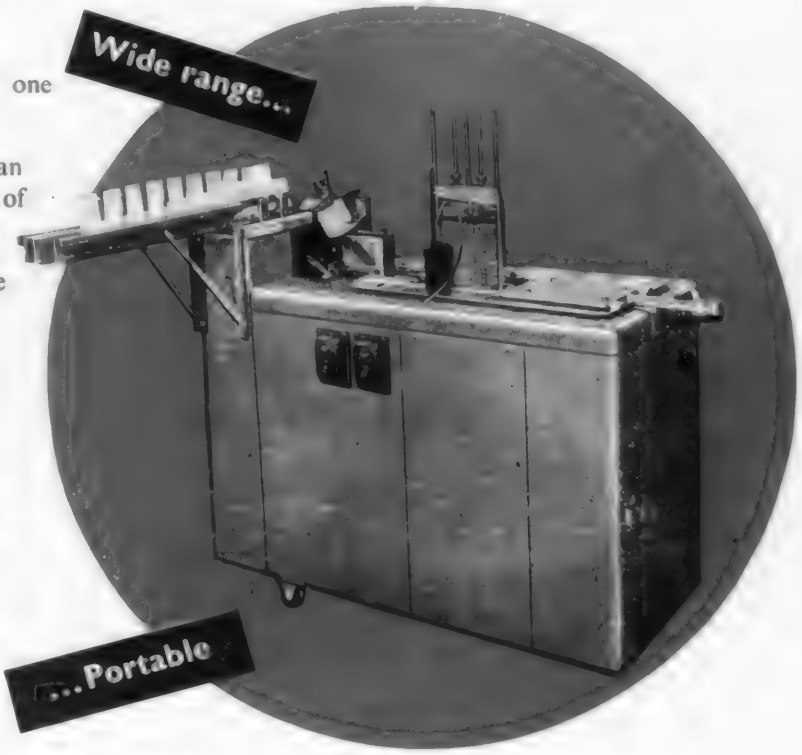
- Saving in wages alone soon repays outlay.



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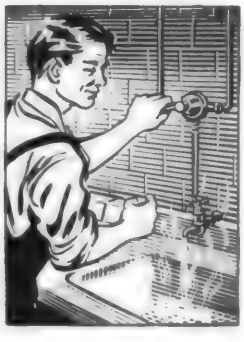

Hot water, plenty of hot water from tepid to very hot, instantly, cheaply—that's what you want and that's what you get with a Leonard Thermostatic Steam Water Heater. Hot water is made only when it is wanted and where it is wanted. There are no heat losses through storage or radiation. No expensive piping or equipment required. The Leonard Thermostatic Steam Water Heater is easily and quickly installed—no upsets, no delays. It is widely used in Laundries, Tanneries, Textile Mills, Breweries, Dairies, and other Food Industries, Tinplate Works, etc.

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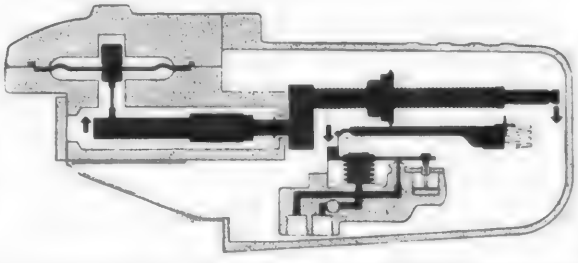
Instantaneous response

Easy to maintain

BROWN DIFFERENTIAL CONVERTER

Functional schematic cross-section of the Brown Differential Converter . . . showing its utilization of the pneumatic-balance principle.



THE BROWN DIFFERENTIAL CONVERTER, a mercuryless type of manometer, is designed to meet the increasing need of industry for an instrument which has a faster, more accurate response to rapid changes in flow and, at the same time, is easy to install and maintain. Operating on the pneumatic-balance principle, it converts differential pressure at the orifice into a proportionate output air pressure which can be translated directly into terms of flow or differential pressure. The range of the instrument is adjustable in situ from 20 to 200 inches of water, no change of parts is necessary. Completely protected against over-range. Accurate to within ±1% of full scale. Pressure rated at 750 or 1500 p.s.i. and sensitive to differential pressure changes of less than 0.1% of scale.

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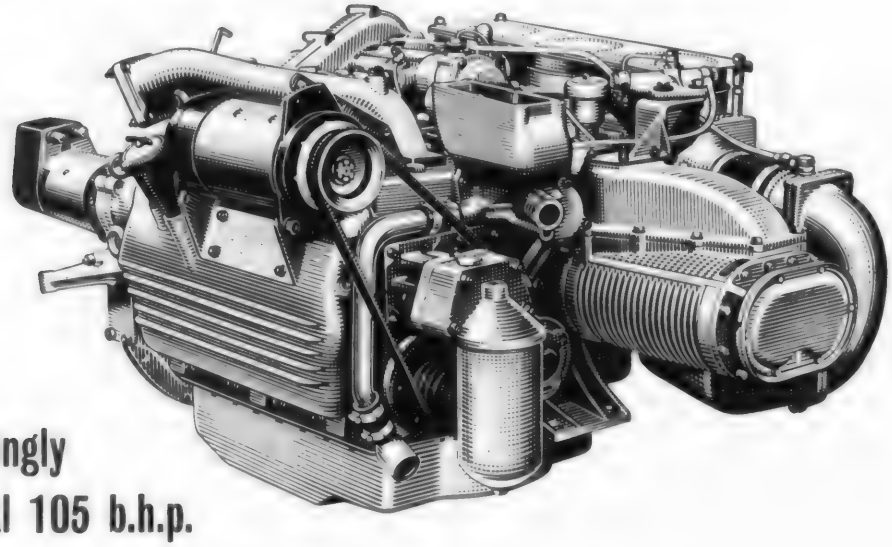

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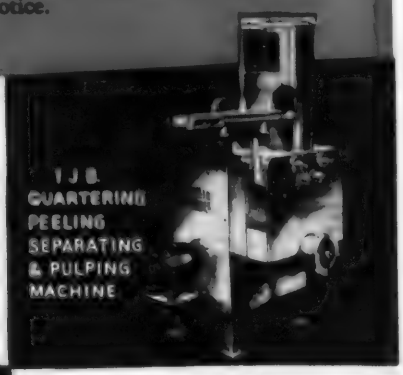
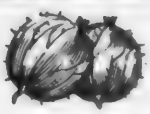


T J B
QUARTERING
PEELING
SEPARATING
& PULPING
MACHINE



Filling and
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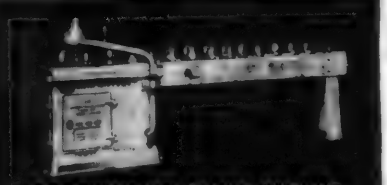

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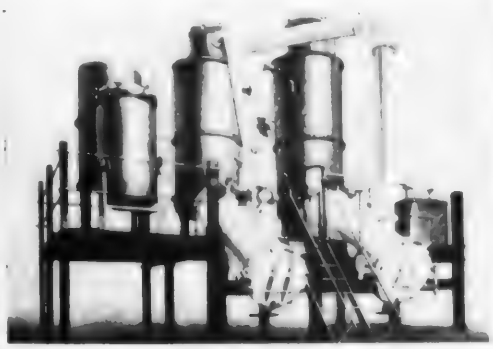

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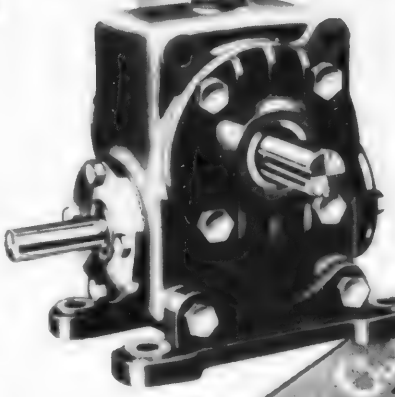

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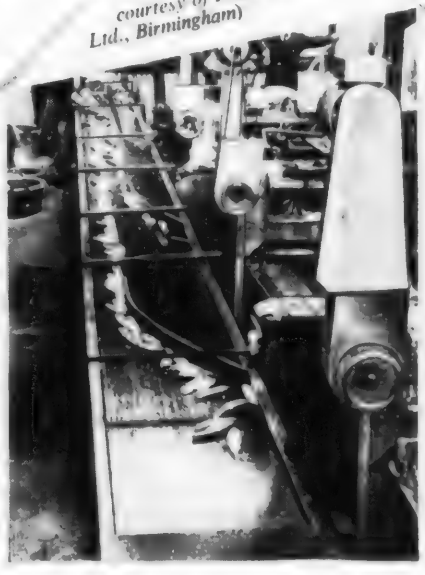
SCANDURA P.V.C. belting

helps the food industry

Cake packing on a 'Motaveyor' (by courtesy of Knightsbridge Cake Limited, Manchester)

Fruit bottling on a 'Motaveyor' conveyor (by courtesy of J. Mawdsley Ltd., Wigan)



Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

As the pioneers of P.V.C. covered conveyor belting British Belting & Asbestos have supplied their SCANDURA belting for many varied applications. Due to its resistance to contamination and its hygienic qualities SCANDURA has become the obvious choice for food conveyor belting. Its lasting qualities had already been proved in food factories two years before its first introduction in Britain's coal mines in 1948, and its fire resistant properties have brought a hitherto unknown safety margin where conveyor fire hazards originally existed. SCANDURA is available now, in varying widths and thicknesses to suit all applications.

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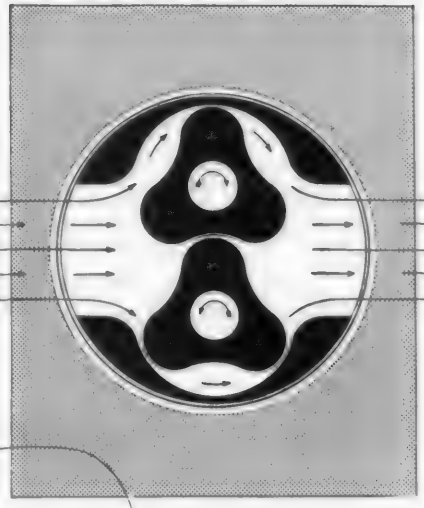
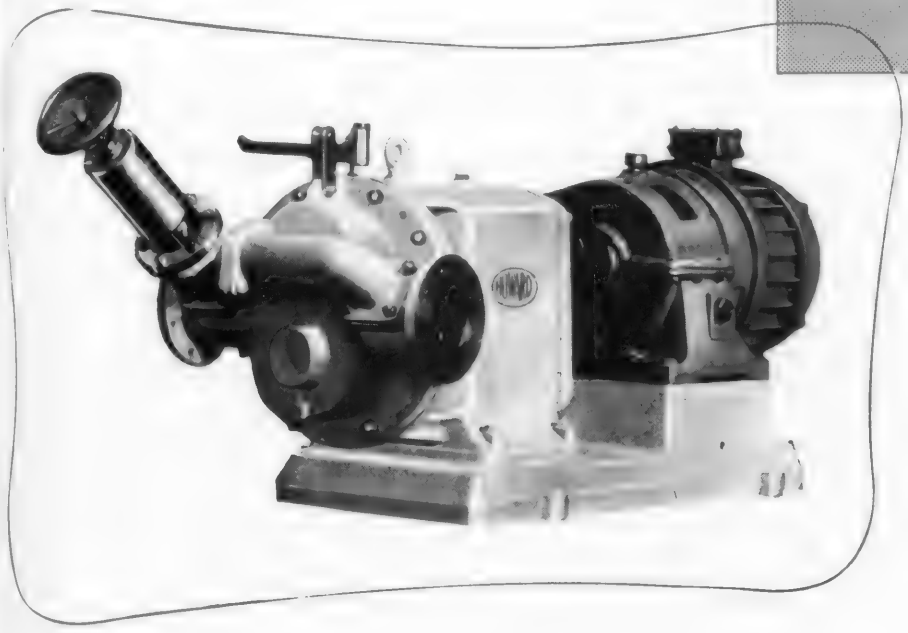
Undisturbed flow





When a liquid is very viscous, the most efficient and economical method of transferring it from suction to discharge with minimum alterations in direction of flow is through a Howard Rotary Pump.
The Howard Rotary Pump has a streamlined flow and offers these additional features.

- *All bearings are external, and of ball and roller type, running in oil.*
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- *Long life with low maintenance charges.*
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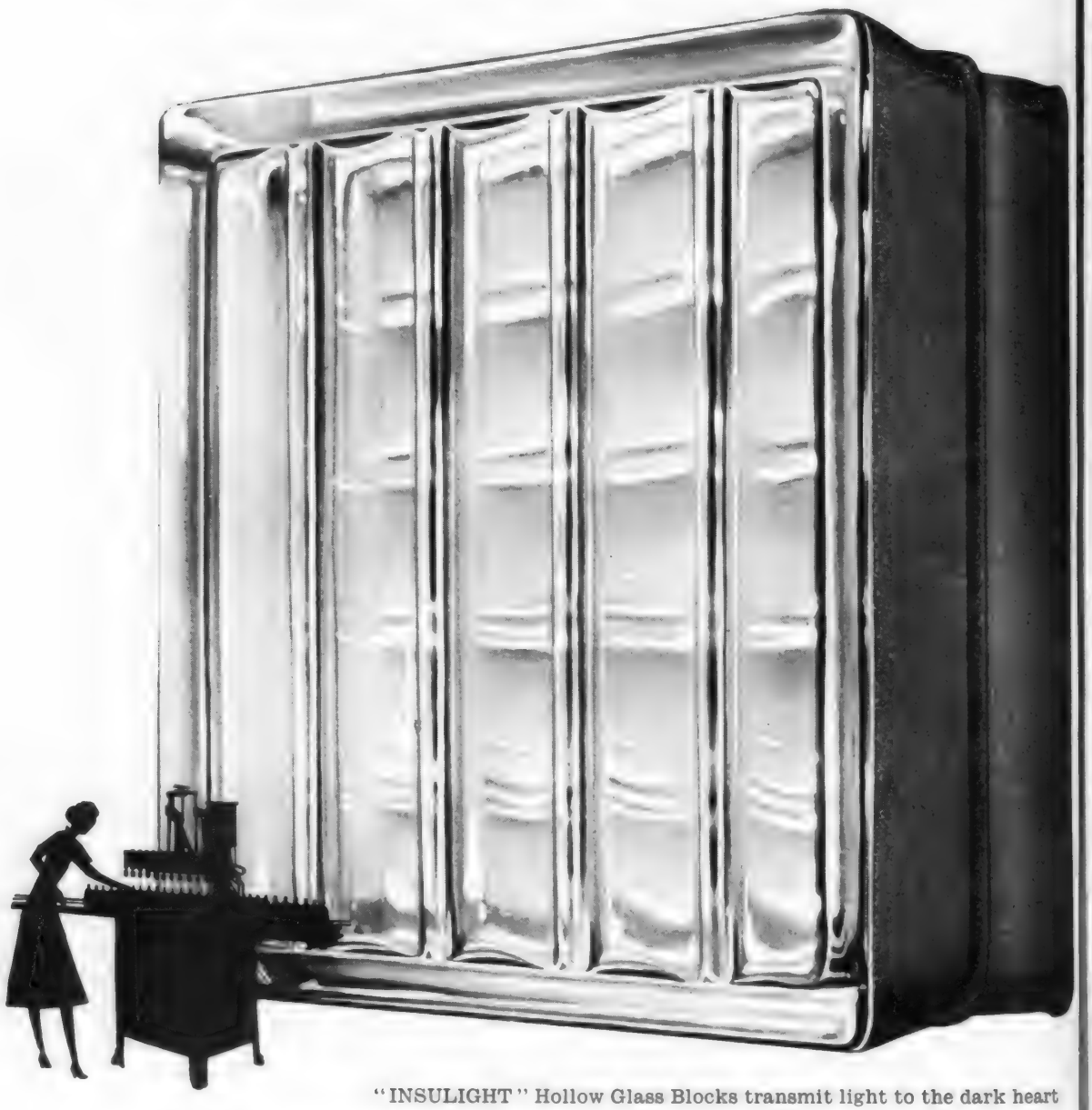
For further details write to:—

THE Howard PNEUMATIC ENGINEERING CO. LTD

FORT ROAD · EASTBOURNE · SUSSEX

"INSULIGHT" lightens labour



"INSULIGHT" Hollow Glass Blocks transmit light to the dark heart of a building or a room, diffusing it over wide areas, in places where ordinary glazing would be undesirable. They cut the racket of the factory, the roar of traffic to a subdued murmur. In places where hygiene is essential, their smooth hard surface is easily cleaned. They hold warmth in and cold out. They keep private places private. In fact, "INSULIGHT" Hollow Glass Blocks do the work of walls—but walls of light.

'INSULIGHT' HOLLOW GLASS BLOCKS

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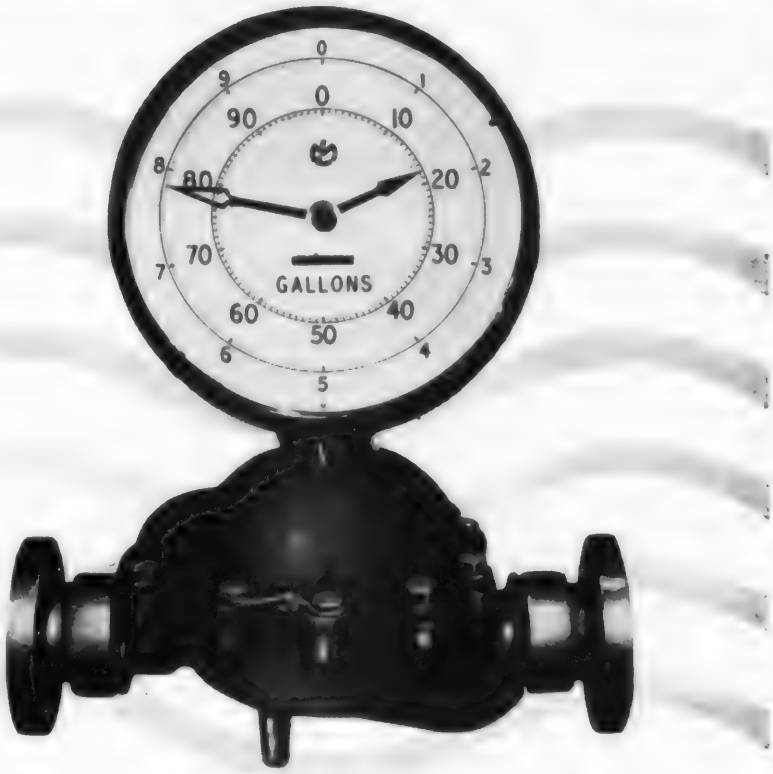

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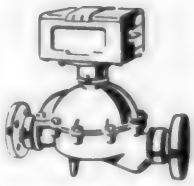
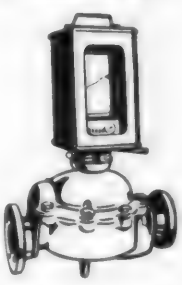
119 Union Street, Oldham, Lancs. Telephone: Main 6432.
LONDON: TERMINAL HOUSE, Grosvenor Gardens, London, S.W.1.
Telephone: SLOane: 0111.



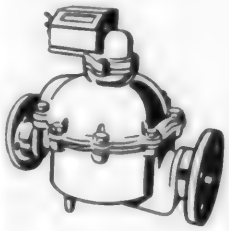
BOX TYPE COUNTER
Re-settable batch-dispensing counter with 7-digit cumulative total register.

6" VERTICAL RE-SETTING INDEX
Can also be used to pre-set a determined quantity, with electric trip to operate solenoids pumps, warnings, etc.

ZEROSET INDEX
Simple turning motion re-sets indicator to zero.



MECHANICAL RECORDER
Gives a graphic record on 5" x 12" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods



FREDEX CONTROLLER
Automatic means for continuous dispensing of fixed quantities of liquids.

This modern battery of high speed Broadbent Centrifugals in Australia processes a large output of superior quality white sugar.

FOOD RAPIDLY AND HYGIENICALLY PROCESSED THE BROADBENT WAY

To process modern foods economically, effectively and with maximum output, insist on installing BROADBENT HIGH-SPEED CENTRIFUGALS. The extensive range covers numerous applications and the prepared food retains its original flavour and purity as suitable corrosion resisting materials are used.

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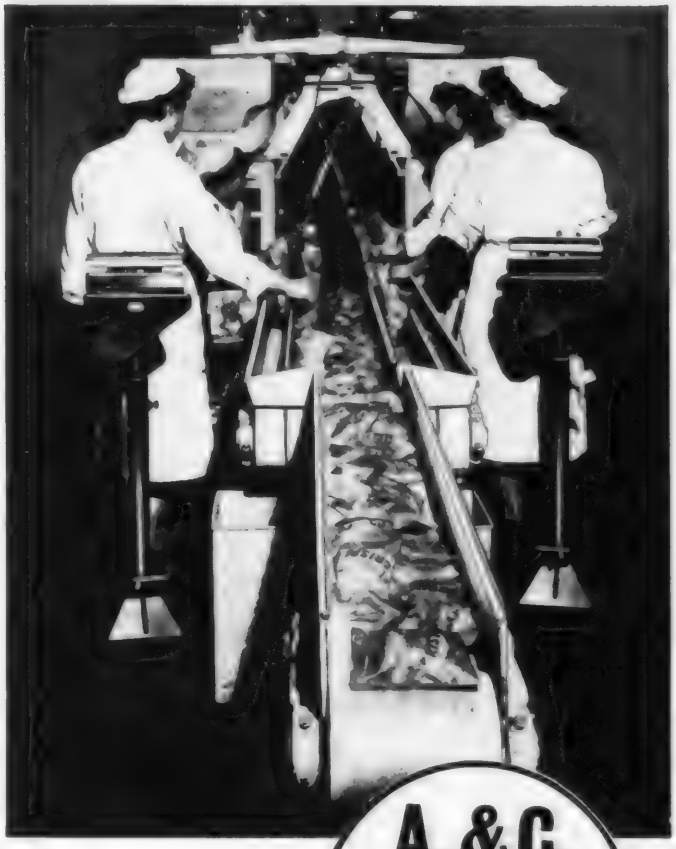
by installing JENNER



Install a Jenner Conveyor and eliminate, once and for all, overcrowding and bottlenecks. Make way for a Valuable Increase in Production! Jenner releases floor space which cannot otherwise be used. Hundreds of square feet which are mere corridors for a labour force engaged in carrying, loading and shifting, are freed for production. Struts and pillars—even differences in floor level—present no obstacle, because every conveyor is individually designed.

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'Not knowing' can be costly.

You can call upon the resources of the Gas Industry to solve your fuel problem by consulting your Area Gas Board. The Boards' Industrial Gas Engineers are ready to give you free advice. They, in turn, can call upon the resources of the whole Gas Industry through the Gas Council's Industrial Gas Development Committee. Get your secretary to fill in these details (or pin this advertisement to your letter heading) **and send to your Area Gas Board or to the Gas Council, 1 Grosvenor Place, London, S.W.1**

NAME .....

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ADDRESS .....

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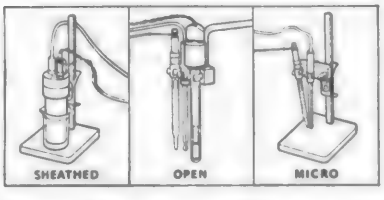
WE NEED HEAT FOR..... 23

*The Gas Industry makes the **fullest** use of the nation's coal.*

GC.68A

Ask users about the

PYE pH METER
AND MILLIVOLTMETER
DIRECT READING — MAINS OPERATED



Electrode Kit to make up all the assemblies illustrated and all necessary accessories are supplied complete with the instrument.

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". . . we write to inform you that our recommendations for the purchase of a number of these equipments for use in our Routine Laboratories have been accepted. You can expect, therefore, within the next week or so to receive orders from a number of our factories. . . . We feel you would like to hear from us this tangible proof of how satisfactory we found your instruments."

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We can easily imagine

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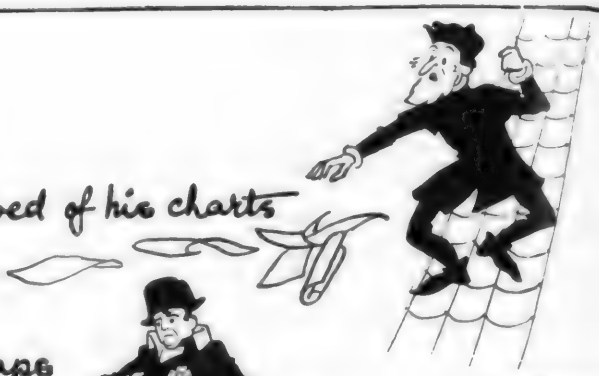
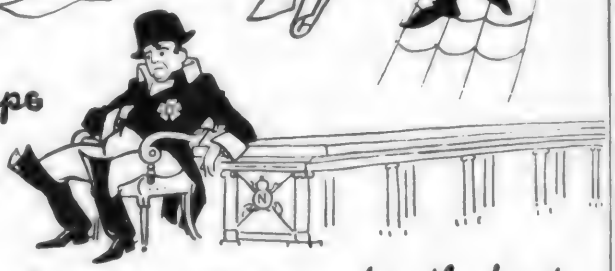
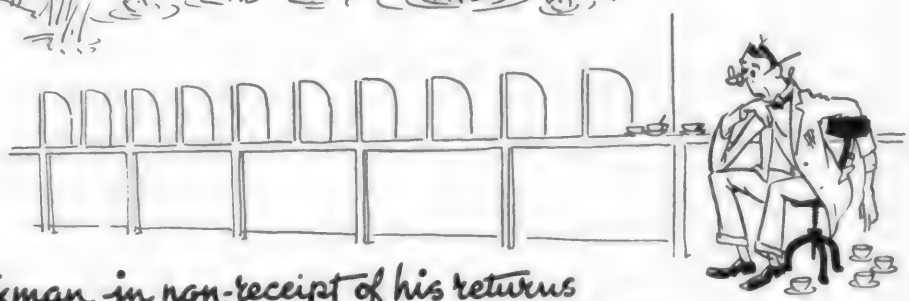


or Napoleon minus his maps



or Izaak Walton parted from his fly-book



or even the taxman in non-receipt of his returns

But
we are utterly shattered by the thought
of the Manufacturing Executive
without a copy of —

We therefore invite those
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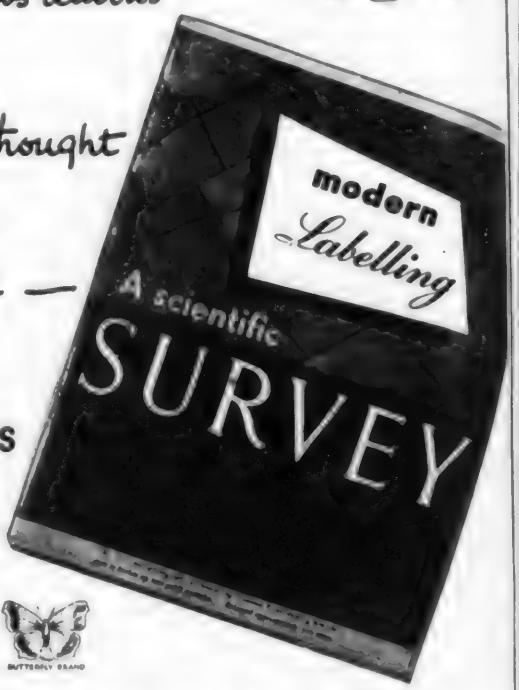
who have not already done so,
to send for one of the remaining copies
of this **IMPORTANT MONOGRAPH**



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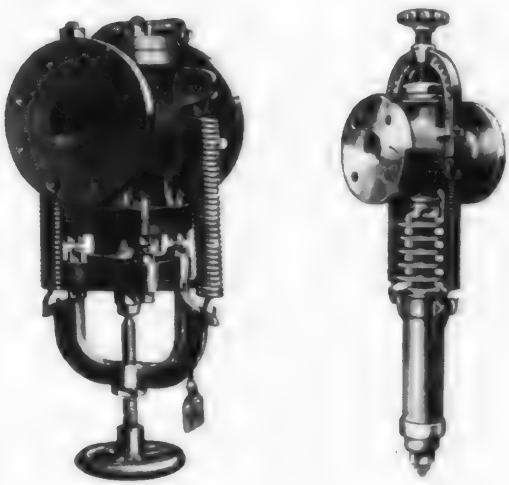
AIR——

WATER——



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are offered for use in saturated and superheated steam lines, air lines and water services, large and small pressure differentials, pressure reductions to atmosphere and below. Of the several types available, two are illustrated . . . Pattern 1902 (right) and Pattern L (left), both of which are for inlet pressures up to 175 pounds per square inch and reductions down to 5 p.s.i. All valves embody a soundness of design and construction resulting from Royles' long experience of actual working conditions.

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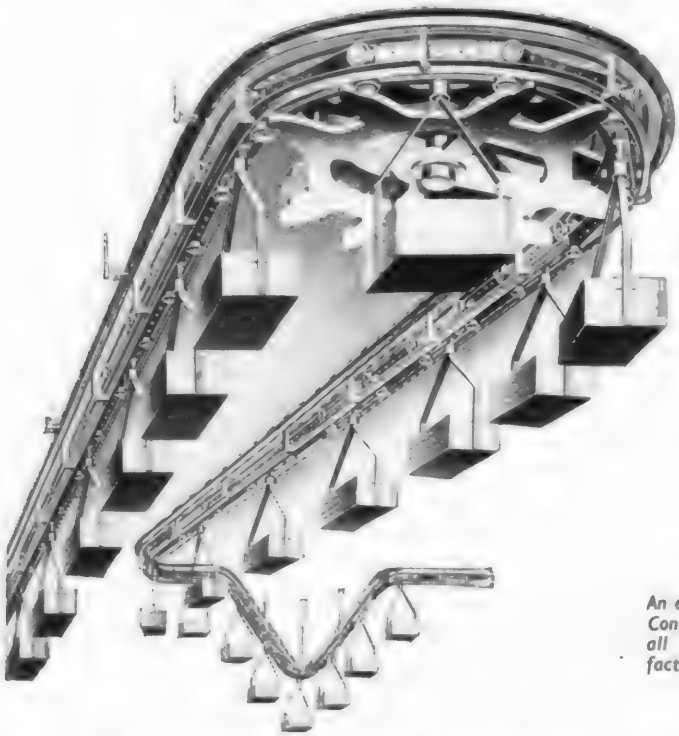

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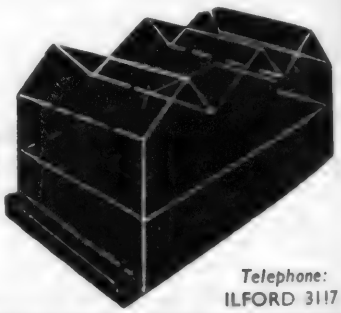
Speed your products from beginning to completion with the

TELEFLEX DUAL-DIRECTIONAL CHAIN CONVEYOR

It is flexible in both horizontal and vertical planes and has full load capacity throughout the rise and fall.

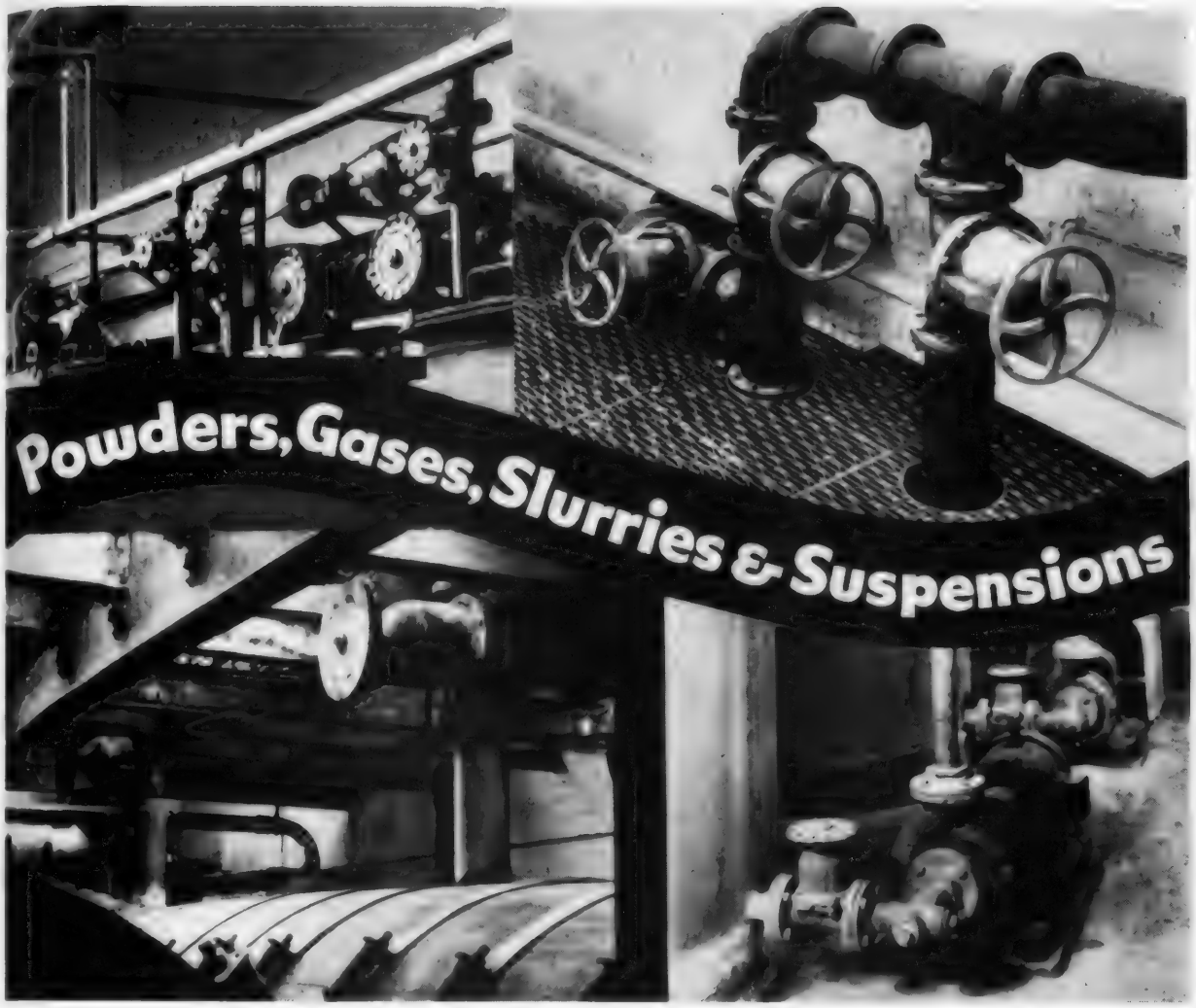


An example of a Teleflex Conveyor which travels all round a particular factory.

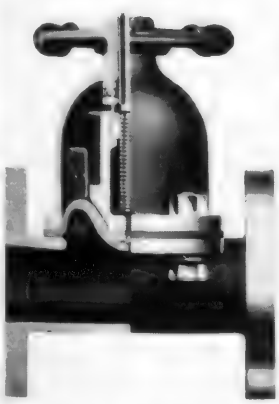
Write for illustrated Brochure Ref. F.M. CON.2, March '54

Telephone:
ILFORD 3117

TELEFLEX PRODUCTS LTD · UPHALL RD. · ILFORD · ESSEX



★For this variety of duties



Saunders Type K Diaphragm Valve with straight bore as used for many of these duties. Shown here in closed position.

In the works of Messrs. John & E. Sturge Ltd., both K (straightbore) and A type Saunders Diaphragm Valves are extensively used. The K type, handling precipitated calcium carbonate and hot lime suspensions, permits regular rodding-through to maintain free flow, and both A and K types with their flexible diaphragm control ensure perfect closure even with suspended solids.

Sizes in this installation vary from the 1 in. screwed type to the 9 in. valves controlling carbon dioxide gas. In addition to handwheel control there is also inverted chainwheel operation for inaccessible valves.

Photographs by courtesy of Messrs. John & E. Sturge Ltd., Lifford Chemical Works, Birmingham.

SAUNDERS DIAPHRAGM VALVES

★ Technical Handbooks explain how nearly 300 difficult fluids, including foodstuffs and beverages, can be safely handled.

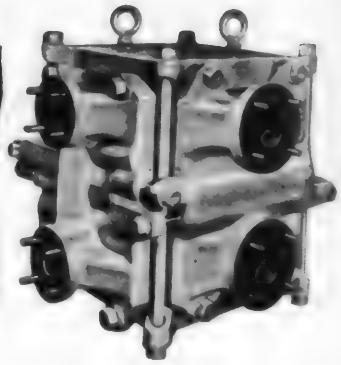
SAUNDERS VALVE COMPANY LIMITED

DIAPHRAGM VALVE DIVISION
MONMOUTHSHIRE

CWMBRAN ENGLAND

HEAT TRANSFER FREE

from metal contamination



PERFORMANCE DATA	
DUTY	To cool 2,500 gall/hr. of a food liquor (viscosity 400 cp.) from 190°F. using water at 60°F.
HEAT EXCHANGER UNIT	One model No. 3 cubic heat exchanger 3 pass Carbon/4 pass Cast Iron.
TOTAL HEAT TRANSFERRED	900,000 B.Th.U./hr. Overall operating co-efficient 190 B.Th.U./hr./ft.²/°F.

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The corrosion resistance and thermal efficiency of carbon and graphite materials have been proved by their extensive use in handling highly corrosive and complex liquids and gases found in the chemical industry. Now, in Food Manufacture, carbon and graphite equipment offers, in addition to outstanding performance, the important advantage of complete freedom from metal contamination.

The GRAPHITE CUBIC HEAT EXCHANGER illustrated is constructed throughout in Delanium* graphite and is being used increasingly by food manufacturers for all unit processes involving :—

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HEAT RECOVERY • CRYSTALLISATION

* *"DELANIUM" is a registered trade mark and identifies the carbon and graphite materials produced exclusively by Powell Duffryn Carbon Products Limited.*

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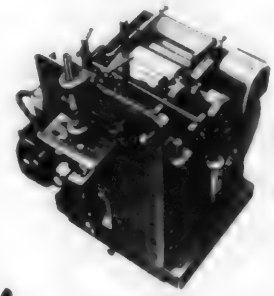
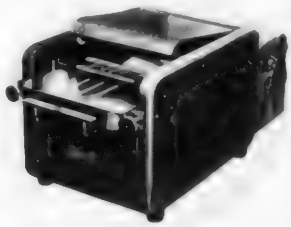
Model 23A and 2C
Semi Automatic Labelling Machine—either for strip gumming or all over gumming.





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Model 1D Machine
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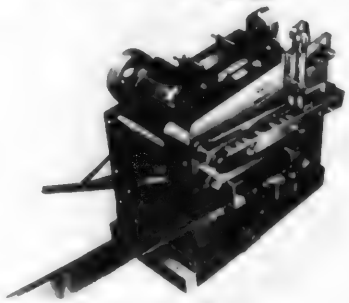

Model 2B
Fully Automatic Labelling Machine for small cylindrical objects.

Detailed specifications of these machines gladly sent on request

D. TRAPOW & COMPANY LTD. ENGINEERS
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Removal of vapours and fumes from boiling pans, ovens and other processing plant

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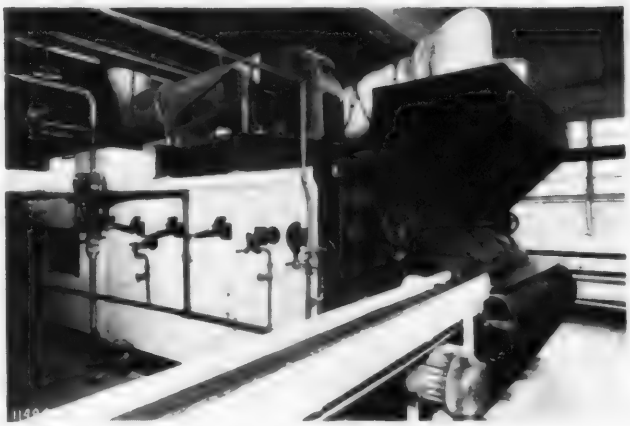
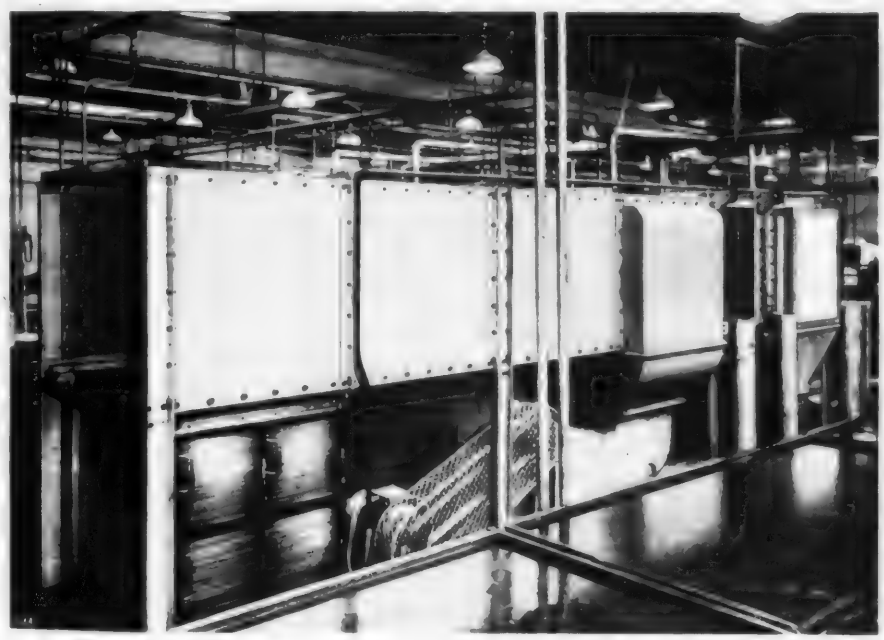
Also man cooling fans for hot spots





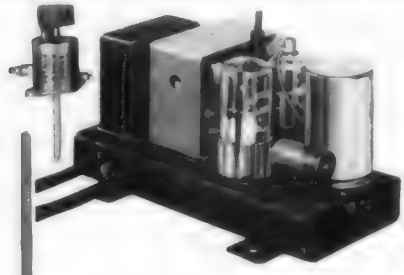
The top illustration shows the loading end of a bread oven equipped with Sturtevant exhaust system for the removal of moisture laden air. The lower illustration of a Sturtevant product cooling installation at a large confectionery works shows viscous air filter, fan and drive, and distributing duct work to tunnel. We shall be happy to send you our publications W.3603 and W.3702 giving details of our ventilation systems.

Sturtevant

ENGINEERING COMPANY LIMITED

Southern House, Cannon Street, London, E.C.4

TEMPERATURE CONTROL?



TEM - CON answers almost every temperature - control problem . . . accurately . . . to ±0.2°C where conditions permit. A great advance on conventional methods, this simplified control system entails only a small amplifier and a sensitive element. Its economical cost and consistent dependability combine with the advantage of *adaptability*. For the sensitive elements (ranging from miniature size and available in various types) are built up from standard components to suit any job. Today, the TEM-CON system is being applied to an infinite range of heating, refrigeration and humidity control problems. The chances are it can serve you uncommonly well.

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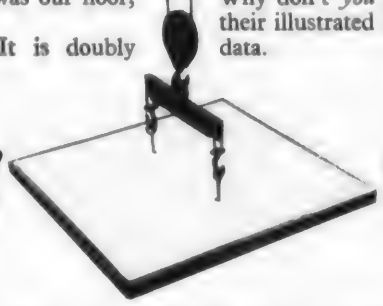
K Kidde

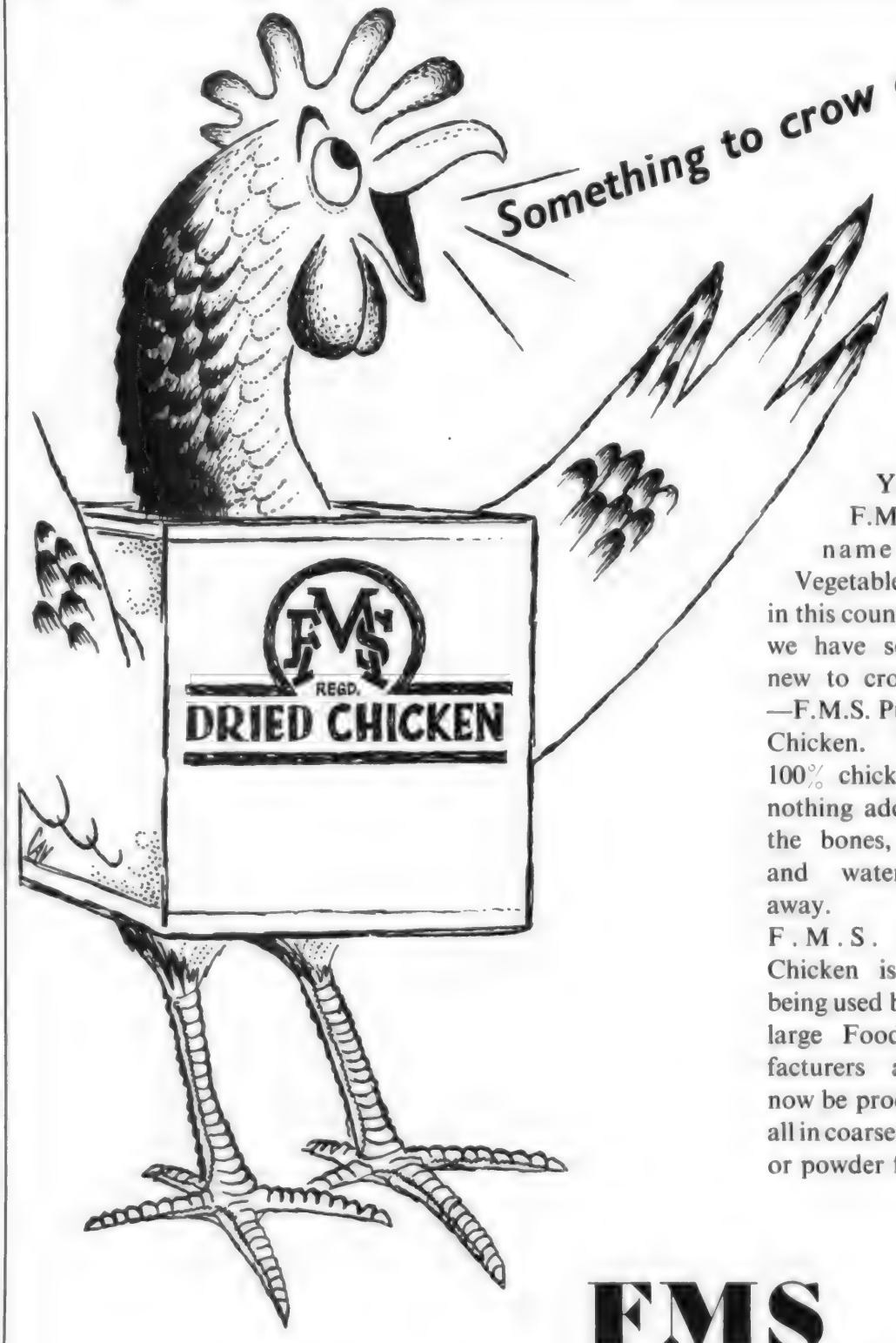
"We've solved it with Stelcon 'RAFT' floors!"

Our problem was to assemble heavy plant and material while our new extension was being built.
We solved it by laying the floor first—Stelcon steel-clad Rafts, the finest heavy duty floor I've struck in a lifetime of experience.
The whole operation was dead easy. We just laid a bed of sand 4" deep, evenly compacted over level topsoil; brought in our rafts and lowered them into position by mobile crane. And there was our floor, ready for immediate traffic.
Each raft weighs about one ton. It is doubly reinforced, bound with angle iron, and faced with the Stelcon steel-clad wearing surface.
We found that by laying the floor first, the remaining building work was speeded up; saving us 7% in overall cost.
What interests me, is that Stelcon Raft Floors have been in service for 18 years, without costing a penny in maintenance. That's quite a consideration.
Why don't *you* get in touch with Stelcon; ask for their illustrated booklet, it contains all the technical data.



Stelcon 'RAFT' FLOORS

STELCON (INDUSTRIAL FLOORS) LTD. CLIFFORDS INN, LONDON, E.C.4 Tel: HOLborn 2916



You know F.M.S. as the name behind Vegetable drying in this country. Now we have something new to crow about —F.M.S. Pure Dried Chicken. This is 100% chicken meat, nothing added, only the bones, feathers and water taken away.

F.M.S. Dried Chicken is already being used by several large Food Manufacturers and can now be produced for all in coarse-granular or powder form.

FMS

(Farm Products) Ltd.
Cereal House,
Mark Lane, E.C.3.

FOOD MANUFACTURE

Vol. XXIX. No. 11 · Published Monthly · November 1, 1954

CONTENTS

	Page
Editorial	423
Chocolate Biscuits—Three Million a Day	427
Antioxidants in Foods—New Recommendations	430
Radiation Pasteurisation of Fresh Fruit. *J. V. Nehemias, L. E. Brownell, and Harriet A. Harlin*	431
Food for Man and Beast	434
Emulsions and Emulsification	438
Spices through the Ages	438
Frozen Concentrated Fruit Juices—I. *J. F. Kefford, M.Sc., F.R.A.C.I.*	439
Alaska Salmon Canning	444
Seaweed Harvesting and Processing Research	447
Abstracts from Recent Food Literature	449
News from the Industry	451
Machinery and Equipment	456
World Food News	458
News from the Ministries	461
Information and Advice	462
Recent Patents	463
Trade Marks and New Companies	464

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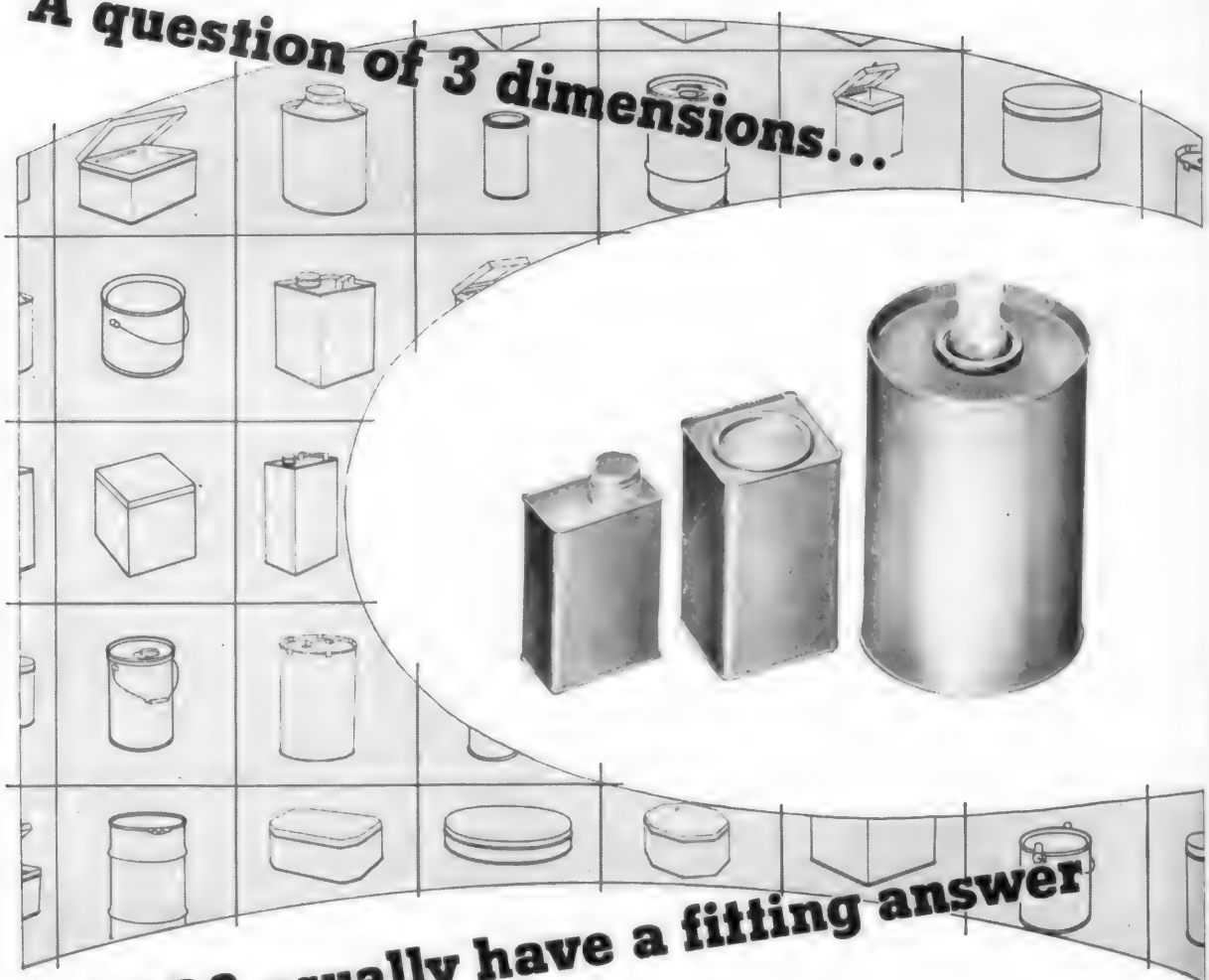
A question of 3 dimensions...



READS usually have a fitting answer

. . . if your product is contained in metal

There is a lot more in fitting a container to a product than just getting the size right. Some products are happy in a plain tin or drum. Others need a special lacquer or enamel lining. Reads can supply the kind of package your customers find most convenient—lever lid tins or canisters, hinged lid tins, special sealing rings or handles, or any of many other features. In fact, from a ½-oz. stamped box to a 50-gallon drum or 500-lb. open-top drum, Reads can supply or design the correct container for your product and its specific market. Write to Reads of Liverpool about packaging.

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R1401a

FOOD MANUFACTURE

Vol. XXIX, No. 11 November 1, 1954

Continuous Fermentation

AT the Chemical Research Laboratory, Teddington, we were recently shown a process for the continuous culture of micro-organisms which may have a profound effect upon industrial fermentations. We were told that the principles of the process may lead to improved methods for the production of both bakers' and food yeast, vinegar, industrial alcohol, and lactic acid. Furthermore, they could be applied to processes for the production of fat by various micro-organisms and for the mass production of *Chlorella*.

The technique of continuous fermentation was developed by the Microbiological Research Department at Porton, Hampshire. The C.R.L. scientists have applied it to the microbiological synthesis of sulphur using sulphate-reducing bacteria, and have built a pilot plant for this purpose. The process works as follows: a solution of salts, including sulphate, and yeast extract is passed continuously into an air-tight vessel into which hydrogen and carbon dioxide are bubbled. The contents of the vessel are kept at 30°C. and stirred continuously, air being rigidly excluded. Under these conditions the sulphate-reducing bacteria are kept in the logarithmic stage of growth, in other words they are dividing at their maximum rate; the rate of reduction of sulphate is also at its maximum. In the course of their growth the bacteria generate hydrogen sulphide, most of which is separated from the liquid which is continuously drawn off from the reaction vessel. The C.R.L. process stops at this stage, but in a proper sulphur manufacturing unit the H_2S would be burned under conditions of controlled oxidation to give sulphur or sulphuric acid.

The significance of the process, outweighing its importance as a means of producing sulphur, lies in the technique of maintaining the micro-organisms at the maximum rate of sub-division and activity, thus greatly shortening the period of fermentation.

Continuous culture is exciting much interest among fermentation chemists. However, so far no commercial fermentation by this method has been achieved. The nearest to it is an almost continuous process of fermenting yeast from waste sulphite liquor which has been set up in the U.S. Apart from its advantage of speed, continuous culture might be appreciably cheaper than present fermentation methods. Because it is continuous, smaller plant can be used and power requirements would probably be smaller. Another factor here is that since the plant would be running day and night, off-peak electricity could be used. Against these advantages must be placed the fact that continuous culture demands very strict operating techniques, being intolerant in most circumstances of even the slightest breach of sterility. Even at this early stage, however, it is clear that the new technique is potentially a major advance in industrial fermentation.

Bread Rolls from Fish Flour

IN co-operation with the Chilean Government, the Food and Agriculture Organisation has recently completed large scale feeding trials with flavourless, protein-rich fish flour.

In the trial, 140 Chilean school children, from five to 14 years old, received daily a 90 g. bread roll containing 10 per cent. of fish flour.

The rolls were only slightly darker in colour than ordinary bread rolls, and smell, taste, form, and consistency of crust and crumb were normal.

The bread was eaten by the children without a single case of rejection or complaint, nor were there any digestive troubles traceable to the bread.

The United Nations Children's Fund, which has been following with great interest the work started by FAO on the use of fish flours in areas deficient in other forms of animal protein, has now set aside funds to be spent on similar trials with fish flours in other areas.

These tests by FAO are of great importance to dozens of technically under-developed countries of the world where diets are low in high-grade animal proteins. Foods to meet these deficiencies must be cheap and must be able to stand transport over long distances and storage for considerable periods, often under most unfavourable conditions, without deterioration. Edible fish meal, or fish flour, meets these conditions. The basic material is inexpensive, the protein content high, and processing costs low.

The main barrier to wide use of the food in many areas is its flavour and smell, which, in most varieties of the flour, are definitely fishy. In most inland areas, where fish is rarely consumed, this fishy flavour lowers its attractiveness, although children without strongly formed eating habits may not object

to it. In several parts of the world, therefore, flavourless fish flours are being developed to avoid this disadvantage. The flavourless type used in the Chile tests is one of the most successful so far manufactured. It was produced by means of a process developed by a South African company which has had a large pilot plant in operation for some time.

In some countries, especially in the Far East and Africa, flavoured fish flours are preferred to flavourless products. It is hoped that acceptability tests with flavoured fish flour can be started soon.

Food Dyes and Cancer

LAST year dyestuffs known to cause cancer in animals were approved by the United States Food and Drug Administration for use in foodstuffs to be consumed by human beings. This disturbing statement was made by Dr. William E. Smith of New York University-Bellevue Medical Centre at the sixth international cancer congress held in São Paulo during which strong pleas were put forward for international agreements to bar the use in foodstuffs of dyes and other ingredients known to cause cancer or suspected of causing it.

In urging the need for such an agreement, Dr. René Truhaut, of the University of Paris, recommended that rigid requirements be met before suspected substances are cleared for inclusion in any list of safe dyes and other additives. Materials should be tested on at least three generations of three different kinds of animals (one species at least not being rodents) and found harmless in amounts of at least one hundred times the relative strength that would be used in foodstuffs.

This standard is the one recommended by a committee representing the medical profession in Belgium, France, Britain, Luxemburg, and the Netherlands. Dr. Hermann Druckrey of Freiburg in Breisgau, Germany, reported similar views among German physicians and observed that there was no "recovery factor" where substances causing cancer were concerned. A person absorbing even infinitesimal amounts would still have the cumulative effect, and when a certain level was reached and a period of latency had passed, the effect would become evident in the form of a tumour.

The need for the formation of a world commission on cancer prevention is in no doubt, and any steps that may be taken by food manufacturers to help in avoiding cancer deaths should receive support at the highest level.

In this connexion it is interesting to note that the Preservatives Sub-Committee of the Food Standards and Hygiene Division of the Ministry of Food is considering the question of food colours very thoroughly at the present time. Special attention is being paid to the toxicity of colours and information on this aspect has been collected from all parts of the world.

Antibiotics Danger

DURING the course of his address at the 21st annual meeting of the National Agricultural Chemicals Association, Mr. William R. Jester, assistant director of the Division of Antibiotics, Department of Health, Education, and Welfare described the practice of using antibiotics as food preservatives in order to reduce heat sterilisation time and temperature as dangerous.

This does not mean that investigations into the use of antibiotics as preservatives for such foods as fresh and frozen commodities, including beef and beef products, a variety of fishery products, dressed poultry, and many kinds of vegetable will come to an end, But the primary use of antibiotics is to heal the sick and, as Mr. Jester indicated, we should be alert to prevent their use in any manner that would negate their value as important life saving drugs.

Olive Oil Agreement

THE establishment of an international agreement on olive oil production and trade has been recommended by an international working party of experts who met in Rome under the auspices of FAO. The object of the agreement would be to raise the efficiency in production and marketing of olive oil, improve quality, stimulate demand, and ensure steady domestic and international supplies despite the fluctuations generally occurring in alternate years in the size of the crop.

In general, these alternating years of heavy and short crops have occurred simultaneously in all major Mediterranean producing countries. Most producing countries have set up some domestic system of storing part of the excess crop during the large crop years, releasing the surplus in the next year, but the lack of co-ordination between the systems and the difficulties encountered by the interested countries have prevented a stable international market for olive oil.

The Working Party's plan for international agreement proposes to deal with this through both technical and economic measures. The technical measures involve a co-ordinated drive to reduce the cost of olive oil production, processing, and marketing by modernising practices and by promoting research to discover still better methods.

On the economic side, an international olive oil council would be established to help olive producing countries to concert their measures for stabilising supplies. No attempt would be made to control production, as the upward trend is in line with the growing demand. However, individual government operations in storing or releasing stocks would be co-ordinated in line with the recommendations of the international council. It is also suggested that an associated international olive oil fund be established to help finance certain storage operations.

Scotland's "New" Liqueur

A NEW Scottish liqueur, a revival of the one used by the Clan Gregor for many years, is being launched under the name "Kay Vonnie," which is a phonetic rendering of the Gaelic "ce mhonaidh" meaning "cream of the moor." The liqueur, a seven-year-old malt whisky from Speyside mixed with heather honey, wild strawberry, wild cherry, bog myrtle, and herbs, is 20 under proof.

It is indicated that the revival stems from the retention in Kansas, U.S.A., of a very limited quantity of old liqueur taken by emigrants from Scotland in the late nineteenth century. The liqueur was returned to Scotland in 1925 by an American visiting Scottish relatives and remained in Moray until 1951 when a son of the house, a chemist, started investigations. After three years, he succeeded in re-creating the lost liqueur and, although a total abstainer on religious grounds, has now been persuaded to allow the liqueur to be marketed. However, he is not personally connected with the new £10,000 company formed for this purpose under the name Traditional Liqueurs, Ltd.

Experiment in Co-ordination

THE proposal to merge the Ministry of Food with the Ministry of Agriculture appears to be one of the more controversial of the governmental changes announced on October 18. Controversial it might be, yet it can hardly have come as a surprise, for right from the beginning of their administration the Conservatives have made clear their belief that the Food and Agriculture Departments should be co-ordinated. They have an international precedent in the Food and Agriculture Organisation of the United Nations even though this body has no operative functions, its work being limited to the collection, study, and distribution of data, the promotion of research, and the provision of technical advice and assistance to member governments. Now that the work of the Ministry of Food has been so drastically reduced, the government feel that it no longer requires the full-time attention of a separate Minister and therefore propose the amalgamation of the two ministries to form a new department concerned with the provision and distribution of food, whether from home or abroad.

The immediate press reaction has ranged from condemnation of the new arrangement to cautious approval. The critics fear that the disappearance of the Ministry of Food as such robs the consumer of the guardian of his interests. *The Times*, for instance, thinks it is asking too much of any Minister to be able to hold the balance fairly between the interests of the consumer and the powerful agricultural industry "which will quite rightly and naturally always fight for the best terms it can get." The *Daily Telegraph*, on the other hand, thinks that the arrangement will work provided the right man is in charge, and points out that the Minister of Agriculture, who will now assume responsibility for the two Departments, is a new Minister who may possibly use new methods.

It is held that it is too early to assume that if consumers' and producers' interests are to be protected by the same person, the former will inevitably be sacrificed to the latter. Indeed, it is thought the farmers may find a Minister who sees both sides of the question tougher to deal with than one who sees only their own. The flaw in this argument is that too much reliance is placed on the personal qualities of the Minister. If Mr. Heathcoat Amory can make a success of this ambitious experiment in co-ordination it will be a notable achievement, but it still seems imprudent so to design the machinery of government that it can be run only by supermen.

Research at the Mellon Institute

A REVIEW of the many different departments of the Mellon Institute and accounts of the research carried out during the year ended February 28, 1954, are contained in the forty-first annual report of the Institute.

The Multiple Fellowship of H. J. Heinz on experiments on the variation in composition of gases dissolved in puréed fruit and vegetable products over prolonged storage periods confirmed the hypothesis that one of the fundamental reactions in discoloration was gradual oxidation. Objective spectrophotometric measurements of the extent of discoloration, using transmittance and reflectance techniques, showed it to be closely correlated with the total volume of dissolved gases.

During storage, the total gas volume and the volume percentage of dissolved carbon dioxide tended to increase with the measured discoloration, while the oxygen remained relatively constant. The variance of analytical results was significantly greater in discoloured samples than in non-discoloured controls.

The pattern seemed to be one of microleakage of oxygen, which was converted into carbon dioxide by the discoloration process. The presence of hydrogen in foods packed in glass containers indicated electrolytic attack upon the closures.

Chemical studies of the end products of the discoloration of fruits and vegetables revealed that most of them are small enough to go through a dialysis membrane. They usually absorb light strongly in the ultra-violet, with absorption maxima about 260 to 280 mμ. The discoloration reaction is apparently only kinetically different between tin and glass containers. The amount of ferrous iron needed to catalyse this reaction was found to be of the order of 10 to 100 parts per million, although smaller levels

produced significant changes over longer periods of time.

The most important single discovery regarding the use of piperonyl butoxide in the work carried out by the Insecticide Fellowship of the Rex Research Corporation was that compositions containing it could be safely and effectively employed as direct additions to grains and other stored products to protect them from insect infestation. This development is increasingly important as a means for conserving the world's food supply. The application of compositions containing piperonyl butoxide to paper cartons and bags and other containers for foods and feeds is likewise being utilised.

Investigations carried out by the Multiple Fellowship (Corn Products) of the Corn Products Refining Co. were largely concerned with zein, the alcohol-soluble fraction of corn protein. This work has made possible the production of stable zein emulsions characterised by low viscosity at high solids, and an ability to produce films which have clarity, gloss, and water resistance comparable to coatings obtainable from alcoholic solutions. Other continuing studies on zein have provided valuable technical information on multiple solvent systems, and have resulted in the development of new formulations for use in protective and decorative coatings.

Honey Harvest

THE wet summer has especially hit British bee-keepers, who have had enough on their hands with all the diseases and pests which affect their swarms. Honey harvests have been among the worst on record. This may not trouble the average townsman who thinks only of everyday sugar on the table, yet honey was the sweetener when sugar was a rare Eastern product.

While our white clover yields "pure white clover honey" superior to any unblended types, the rose bay willow herb, so common in Britain, is literal proof of the words of King Henry V in the play of that name: "Thus we may gather honey from the weed." Add charlock, sainfoin, heather, and other British honey plants, and still the expert honey-taster claims to tell at once from which source the bee has obtained its nectar.

With 1954 being an exception to King Henry's words, with the National Honey Show at Westminster abandoned, the question of honey shortages affecting other trades will crop up. As an alternative to jam for tea, honey seems to find moderate use. Yet it has various other applications, as in making mead or metheglin, a more potent application than a one-time use of honey in soft drinks. Honey also plays a minor role in medical or pharmaceutical preparations, while uses dependent on its hygroscopic properties include not only baked goods which retain their softness, but some application as a "humectant" or humidifying agent in tobacco as an alternative to glycerol or mannitol.

Far more striking are the adjectival uses of honey. Americans certainly coined "honey-pot" as alternative to "sugar-baby," yet this is little compared with Shakespeare's "honey words," "honey mouths," "honey drop," and "honey bag." But in this land of ours, at one period flowing with milk and honey, bee-keepers beg to differ from the *littérateur* in one respect. "Honey-dew" seems the very acme of sweetness or attractiveness, with Coleridge's immortal words in *Kubla Khan*:

> For he on honey-dew hath fed,
> And drunk the milk of Paradise.

But to the bee-keeper, honey-dew is rank poison, gathered by lazy bees with depraved taste during "a sad lapse." It gives, says the harassed bee-keeper, a bastard honey fit only for boot polish manufacture!

"Money is honey, my little sonny," wrote Thomas Brown in jocular mood; yet the converse is not true if honey-dew and the English summer of 1954 have anything to do with it.

Readers are reminded that all communications to
FOOD MANUFACTURE
must be addressed to
Stratford House,
9 Eden Street,
London, N.W.1.

Eggless Meringues

THE manufacture of eggless meringues is not in itself news of the man-bites-dog variety; only recently Dr. W. A. Caldwell, addressing a meeting of chemists at St. Andrews, Scotland, gave his version of the 1954 meringue—a cupful of methylethyl cellulose mixed with water, whipped to the consistency of white of egg, with sugar stirred in, the whole being "squeezed into blobs" and baked in a cool oven for four hours. All that is then required is the addition of a little sodium carboxymethyl cellulose.

But in Australia, a former German scientist attached to the C.S.I.R.O. has devised a formula which sounds more wholesome than the cellulose meringue and, moreover, makes use of skim milk, much of which is wasted in Australia. The skim milk is concentrated to about three times its normal strength and lime is added; the mixture is then frozen and powdered by spraying it into a stream of hot air.

For 40 meringues less than $\frac{1}{2}$ oz. of this milk powder is beaten into $5\frac{1}{2}$ oz. of water and 11 oz. of sugar is added, the meringues being dried in a low oven for $2\frac{1}{2}$ hours.

It is anticipated that Australians will soon be able to buy this meringue powder at a cost considerably less than that of an equivalent quantity of eggs.

Workers remove biscuits from the conveyor belts emerging from the oven. Between 40 and 50 biscuits are lifted at a time by pressure on the ends of the batch. The biscuits are placed in ventilated aluminium baskets each holding 35 lb.

Chocolate Biscuits – Three Million a Day

CADBURY'S NEW FACTORY AT MORETON, CHESHIRE

The rising demand for chocolate biscuits has led Cadbury Brothers to devote entirely to their manufacture the first production block of their new factory at Moreton, Wirral, Cheshire. Cadbury's have branched out into this area because of the shortage of labour in and around Birmingham where they have been established for well over 100 years. The new factory is the first development on the 77 acre site acquired by Cadbury's. The present plans will not be completed before 1956, the total cost of the work now in hand being about £2¼ million.

IN MARCH, 1824, young John Cadbury went into business as a tea and coffee dealer, and shortly afterwards he began making experiments in the grinding of cocoa beans. For this purpose he used a mortar and pestle, and his workroom was the cellar of his shop. It is from these beginnings that the world-wide business of Cadbury Brothers, Ltd., has grown.

John Cadbury's shop was at 93, Bull Street, Birmingham, and there, in addition to selling tea and coffee, he dealt in hops and mustard of "superior quality." Later, it was the quality of his cocoa and drinking chocolate which gave to John Cadbury's shop its special reputation. Benjamin, brother of John, joined the business in 1847; thus the firm of Cadbury Brothers came into being. In the same year a factory was rented in Bridge Street, off Broad Street, Birmingham.

As they emerge from the oven, all the biscuits are carefully examined before packing into aluminium baskets for transfer to the biscuit store.

General view of the output ends of the baking ovens showing the ventilated aluminium baskets into which the biscuits are transferred; they are then conveyed to the biscuit store.

When competition and hard times overtook the business about the middle of the century, its failing fortunes were revived by two vigorous young men, Richard and George, the sons of John, who, in 1861, handed over to them control of the business. In those times Cadbury employees worked a ten-hour day (many factories worked for far longer hours than these). The partners themselves helped in the workrooms, kept accounts, wrote their own business letters by hand, bought sugar and cocoa beans, and travelled all over the country to find new customers.

In 1879, a new factory was built in the meadowland beside the Bourn stream. Such were the beginnings of the cocoa and chocolate factory at Bournville.

The New Moreton Factory

Cadbury Brothers' new factory at Moreton, Wirral, Cheshire, will, like its "parent" at Bournville, be a "factory in a garden" surrounded by lawns, recreation grounds, and gardens.

The company have expanded into the Wirral for three main reasons:

1. The Government's desire to introduce new, permanent industries to development areas.
2. The shortage of labour in and around Birmingham.
3. The growing demand for chocolate biscuits.

The first production block of 220,000 sq. ft. of the 77 acre site has already been completed, and will be devoted entirely to the manufacture of chocolate biscuits, with an output of more than three million a day.

Providing single-storey accommodation for the production of chocolate biscuits and two-storey storage accommodation for raw materials and finished stock, the factory employs 450 men and women with an eventual capacity for 600 employees in the existing buildings.

Delivery of raw materials and despatch of finished goods is at present executed by road vehicles operating from the loading deck on the South Road. A rail siding will be installed shortly to supplement these. Raw materials on arrival at the loading deck are taken up by lift to first floor level and are fed by gravity to the mixing machines.

Baking takes place in continuous ovens extending from the south to the north end of the biscuit making room. Uncovered biscuits are then taken from the north end of the ovens into the biscuit stores ready for chocolate covering. This takes place on a series of layouts running north to south in the chocolate covering room.

Cooling and packing are completed on these layouts and the finished goods proceed to the stockrooms, despatch being from the east end of the deck.

Production Process

The manufacture of chocolate biscuits calls for strict attention to hygiene and quality throughout all stages of processing—mixing, baking, covering, and packing.

Raw materials—flour, fats, and sugar—are processed in a battery of mixing machines at one end of the baking room. Flour and sugar are delivered direct from the store rooms on the first floor, the fats being added at the lower level. Crème making machines are nearby.

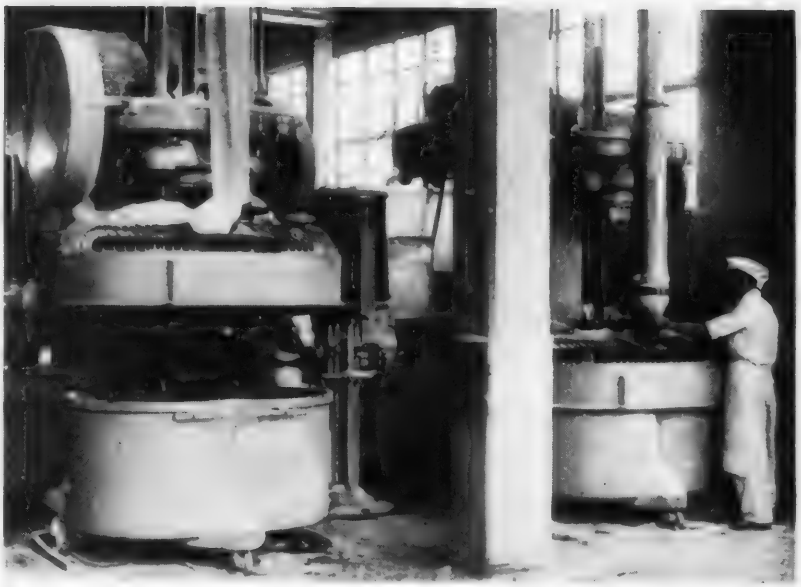
The present daily consumption of raw materials is as follows:

	tons
Chocolate	10
Flour	12
Fats	4
Sugar	4

The biscuit dough is rolled to the required thickness, shape stamped, and carried by conveyor belt into the ovens, each of which uses 24,000 cu. ft. of gas per shift and produces 97,000 biscuits per hour. It takes $8\frac{1}{2}$ minutes for the biscuits to travel through the 160 ft. long ovens at a temperature of between 500° and 550°F. There are numerous inspection ports through which operators keep watch on the whole process.

At the outlet end of the oven, the biscuits are transferred to special aluminium baskets, each holding 35 lb., and placed in the biscuit stores, where they are kept until required.

In the enrobing room, the biscuits are placed on an endless belt and passed through a curtain of liquid chocolate. The covering chocolate—£4,500 worth at a time—is brought 100 miles by road from Bournville in a special ten-ton tanker; insulation and, when necessary, electric heaters keeping the chocolate liquid between 90° to 100°F. during the journey. The chocolate is piped *via* the storage tanks, with a capacity of 10 tons, to the enrobing room.



Two of the mixing machines are ready to receive the flour and sugar from the store room above. The fats are added and the dough is brought to the right consistency for the baking ovens.

After cooling, the biscuits, marked with the familiar "Cadbury's," journey on endless belts to girls who weigh and pack them at the rate of 50,000 $\frac{1}{2}$ lb. packets a day, 3,000 6 lb. tins a day, and 120,000 6d. packets a day.

Automatic wrapping machinery is capable of handling 50 to 60 packets per minute.

The factory is equipped with a surgery, rest rooms, and comprehensive health services. A nursing sister is a permanent member of the staff and a Works doctor visits the factory regularly. A large, airy canteen has a kitchen designed to cater eventually for 1,200 people a day. The men's and women's dressing-rooms are fitted with showers.

SOME SUPPLIERS OF EQUIPMENT

Metal windows and lantern lights: *Crittall Manufacturing Co.*
Granolithic reinforcement: *Surfastol.*
Heating and ventilating: *Brightside Engineering Co.*
Electrical installation: *British Insulated Callenders Cables; Lee Beesley and Co.*
Flooring: *John Stubbs (Marble and Quartzite).*

After being stamped from the dough, the biscuit shapes drop on to the lower endless belt while the surplus dough is carried back to the intake end of the machine.

Economy in the Boiler-house

It has been said that in the U.K. there are no less than 120,000 Lancashire boilers wastefully employed to the extent of 10 million tons of coal per annum. Many investigations have been devoted to industrial fuel saving methods, the outcome of which, to give one example, has been to suggest that the fuel consumption of manufacturing industry might be reduced by 30 per cent.

Some of the ways of achieving this and of attaining a greater all-round efficiency in the boiler-house have been given in a recent work* in which the author deals with fuels, heat, combustion, furnaces and firing equipment, firing methods, boiler-house instruments, boiler feed and feed water, steam boilers and heat insulation, boiler auxiliaries, boiler brickwork and settings, steam demand and fluctuating loads, records, and management.

With the aid of this book it should be possible for plant owners and engineers to bring their plant to the best state of potential efficiency and to operate in conformity with the most modern standards.

* *Industrial Boiler-house Efficiency.* By Chas. F. Wade. Pp. 213 + x. Crosby Lockwood. Price 15s.

Antioxidants in Foods – New Recommendations

A REVISED report has now been presented to the Food Standards Committee by their Preservatives Sub-Committee, making recommendations about the use of antioxidants in foods.

Since the publication of an earlier report on this subject (FOOD MANUFACTURE, 1953, **28**, 305), the Sub-Committee have reviewed the representations received from trade and other interests and the revised report replaces the earlier one.

The present report, which has been endorsed by the Food Standards Committee, proposes that the Public Health (Preservatives, etc., in Food) Regulations should be amended to give effect to the Sub-Committee's revised recommendations.

Before taking any action, the Minister of Food will receive any further representations which interested parties may wish to make. They should be addressed to the Assistant Secretary, Food Standards and Labelling Division, Ministry of Food, Great Westminster House, Horseferry Road, London, S.W.1, and they should be lodged not later than November 30, 1954.

In the Revised Report, the Sub-Committee point out that doubt exists whether use of antioxidants in foods would infringe the Public Health (Preservatives, etc., in Food) Regulations; that use, under strict control, of this class of substance in foods liable to oxidative rancidity is desirable to enable such foods to be kept in sound condition for longer periods, and that use of antioxidants in foods is permitted in some other countries which may export foods so treated to Britain.

Permitted Additions of Antioxidants

In the light of the evidence available, the Sub-Committee have recommended that antioxidants should be confined to foods liable to oxidative rancidity and should not be added to any foods other than to edible oils and fats and to essential oils, to which it should be permissible to add the undermentioned substances in quantities not exceeding those stated:

Antioxidant	*Edible oils and fats per cent.*	*Essential oils per cent.*
Propyl, or octyl or dodecyl gallate, or any mixture thereof	0·01	0·1
Butylated hydroxy-anisole	0·02	0·1

Butylated hydroxyanisole (up to 0·02 per cent.) may be used in conjunction with the gallates (up to 0·01 per cent.) in edible oils and fats; in the case of essential oils, the total amount of antioxidant or mixture of antioxidants should not exceed 0·1 per cent.

In the earlier report the antioxidants recommended were confined to propyl gallate and butylated hydroxyanisole, and the amount of antioxidant to be permitted in essential oils was the same as for edible oils and fats.

For the purposes of the recommendations in the revised report the term "edible oils and fats" covers animal, vegetable, and fish oils, whether hardened or not, vitamin oils and concentrates, and products consisting essentially of fat, such as margarine, shredded suet, etc., but not including butter; and the term "essential oils" includes their flavouring constituents—isolates and concentrates—but not flavouring essences.

The Sub-Committee finally recommend that the permissive addition of antioxidants to foods should be reviewed and if necessary amended in the light of experiences after a period of, say, two years.

Dehydrofrozen Fruit and Vegetables

A DEHYDROFREEZING process for fruits and vegetables developed by the Western Regional Research Laboratory, Albany, California, is said to preserve colour and texture properties and to ensure a more uniform moisture content thereby resulting in the production of better quality products. In addition to its improved quality contribution, the process is said to effect substantial savings in packaging, freezing, shipping, and warehousing costs. Although its application to date has been principally of a testing nature for evaluation purposes, the findings of the Research Laboratory combined with satisfactory trial reports suggest an eventual wide practical usage in the frozen food field.

The process, which is covered by a public service patent, links partial dehydration with freezing preservation, and is designed to retain the benefits of each of these established procedures while at the same time eliminating as far as possible their deficiencies. While successful current applications of the process have been limited to apples, apricots, and pimentos, the Research Laboratory is investigating its applicability to celery, carrots, lima beans, and peas.

Although several companies are producing fairly large quantities of dehydrofrozen apples for market testing, its production in small packages for the retail trade is limited, involving primarily packaging the product in units of 10 lb. or more for wholesale distribution to bakeries. Commercial baking tests performed on the dehydrofrozen apples have shown them to be satisfactory for bakery use because of their adaptability to the various procedures practised by bakeries in making apple pies, their excellent colour and texture, their low sulphur dioxide content, and the absence of free liquid or drip in the thawed product.

To facilitate partial dehydration of apple slices, the Research Laboratory has developed a continuous rotary drier that is reported to simplify the dehydration step and achieve a more uniform moisture content in the product. In addition to its suitability for dehydrofreezing apples, the drier offers promise for use on other commodities.

The process has also been successfully applied to a small lot of apricots and pimentos.

Three companies are producing dehydrofrozen pimentos for use in remanufactured products. Reports state that the process promotes an excellent quality, particularly in colour.

Radiation Pasteurisation of Fresh Fruit

J. V. Nehemias, L. E. Brownell, and Harriet A. Harlin
Fission Products Laboratory, University of Michigan

If the radiation dosage is sufficient, it is possible to achieve complete sterilisation of foods. Certain very real problems remain to be solved, however, before the process can be applied to commercial production. Firstly, it must be clearly demonstrated that no toxins, i.e. induced radioactivity, toxic radiation degradation products, or carcinogens, are produced by the required dose of radiation, and that no dietary deficiencies are caused by component degradation; secondly, general palatability must be maintained; thirdly, the process must be economically feasible. If it is possible to "pasteurise" at lower doses, that is, to inhibit mould formation, fermentation, etc., so that a substantial increase in shelf-life results, all three of these problems become proportionately less difficult to solve. This report* describes the experiments undertaken to determine the degree of pasteurisation as a function of dosage and its dependence on container material and storage temperature.

PEACHES and cherries for the experiment were purchased during the produce season on the open market through the facilities of the University Food Service. Samples selected for each experiment were made as representative as possible of the lot from which they were selected with reference to size, colour, and degree of ripening. All bruised or visibly damaged fruit was rejected. Stems were left intact whenever possible. Thus, any differences in the rate of mould formation which appear as a function of dose should be attributable to differences in treatment.

Each cherry and peach used in the course of this work was individually packaged for the dual purposes of yielding significant statistics on the moulding characteristics of individual fruit and of preventing cross contamination. Three different packaging materials were used to determine the effect of container properties on moulding characteristics. Polyethylene bags, heat-sealed at the Fission Products Laboratory, provided a watertight gas-permeable container. Saran bags, electronically sealed at the Dow Chemical Company plant, provided a watertight relatively gastight container. Lusteroid tubes stoppered and wax-sealed at the Fission Products Laboratory, also provided a watertight gastight container, but with a somewhat different geometry. Lusteroid contains a chlorine-bearing component.

It was desired to compare these three types of barrier with reference to their possible effect on rate of mould formation subsequent to radiation treatment, no attempt being made to evaluate the packaging material on any other basis. A spot-check sample of the finished packages was subjected to a water leak test. As no faulty packages were discovered, it was assumed that the proportion of leaky bags used in the experiment was small enough to be considered negligible.

Treatment and Storage

As soon as possible after packaging, the samples were irradiated, dosage varying in steps of 200,000 from 0 to 2,000,000 rep. Irradiation at all levels was conducted concurrently as far as possible; this can be done in the 10,000-curie gamma cave by irradiating simultaneously at different dosage rates. From 15 to 30 samples were irradiated for each experiment at each dose to reduce the effect of random variations in fruit and mould on the total data. The actual number used in a particular experiment was determined by the packaging material, fruit,

* *Courtesy Atomic Energy Commission, through Contract No. AT(11-1)-162 and the Engineering Research Institute of the University of Michigan.*

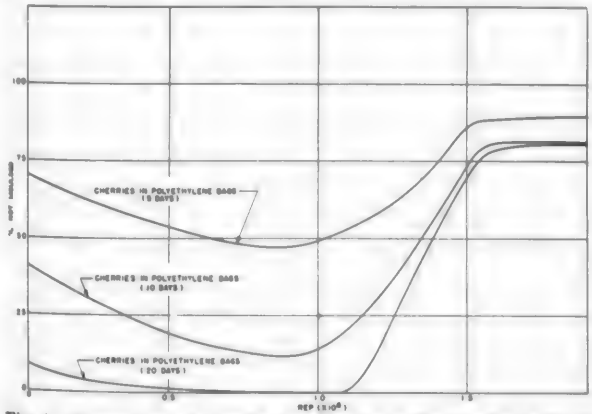


Fig. 1. Percentage of cherries stored at room temperature which did not show mould formation as a function of dose received after various storage periods.

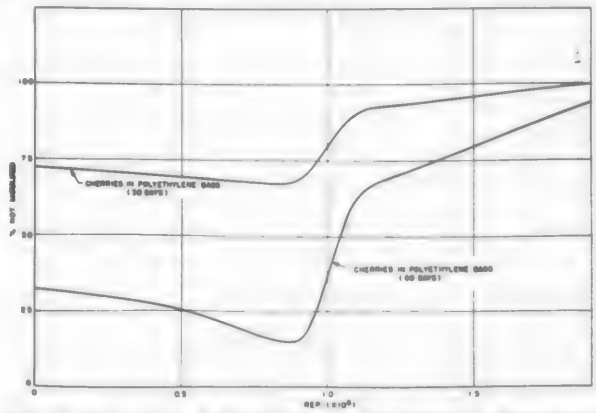


Fig. 2. Percentage of cherries stored at refrigerator temperature which did not show mould formation as a function of dose received after various storage periods.

Fig. 3. Number of cherries left free of mould after 90 days' cold storage. Dosage varies in steps of 200,000 rep from non-irradiated control at left to 2,000,000 rep at right.

manpower for sealing, irradiation volume, and storage space available.

Following irradiation, the fruit was immediately stored, either at room temperature (70°F.) or at refrigerator temperature (40°F.), in such a way as to facilitate visual inspection. The stored fruit was then inspected daily for the appearance of mould. Whenever mould was first detected on a sample of fruit, that sample was removed and destroyed, no other criterion being used in this series of experiments. The effects of radiation on texture, colour, odour, and taste are being studied in separate experiments.

Results

Fig. 1 is a plot of the percentage of cherry samples remaining without visible mould formation, after five, 10, and 20 days of storage at room temperature as a function of the radiation dose received. Approximately 50 per cent. of the unirradiated (control, 0-rep) samples in this experiment had moulded after eight days. At doses above $1{\cdot}5 \times 10^6$ rep a substantial majority of the cherries were still free of mould even after 20 days at room temperature. At doses below 1×10^6 rep, however, the irradiated fruit actually moulded more rapidly than the unirradiated fruit.

Fig. 2 is a similar plot for cherries stored at refrigerator temperature. These curves are similar in form to those for storage at room temperature, but moulding occurred much more slowly at the lower temperature. Again it is observed that for doses less than 1×10^6 rep the rate of mould formation is greater than for untreated fruit. Fig. 3 shows cherries after 90 days of refrigeration. The column of cherries on the extreme right has received 2×10^6 rep, the second column from the right $1{\cdot}8 \times 10^6$ rep, and so on across the board to the extreme left column, which was untreated. Each column was initially of equal length and cherries were removed as soon as visible mould formation occurred. Thus the cherries shown in the photograph had not developed mould after 90 days. A line through the tops of these columns can be compared with the curves in Fig. 2 for an indication of how much moulding took place between 60 and 90 days.

Fig. 4 illustrates the comparison between polyethylene bags and lusteroid tubes for storage at room temperature. Much less mould occurred on the samples in lusteroid tubes than in polyethylene bags at all dosages. In fact, the rate of mould formation on cherries in lusteroid tubes was, over much of the range studied, approximately independent of

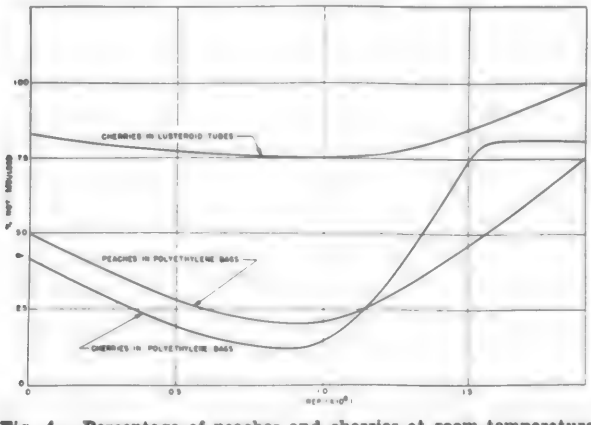


Fig. 4. Percentage of peaches and cherries at room temperature which did not show mould formation in polyethylene bags and Lusteroid tubes as a function of dose received after various storage periods. Moulding phenomena for cherries are approximately duplicated by peaches.

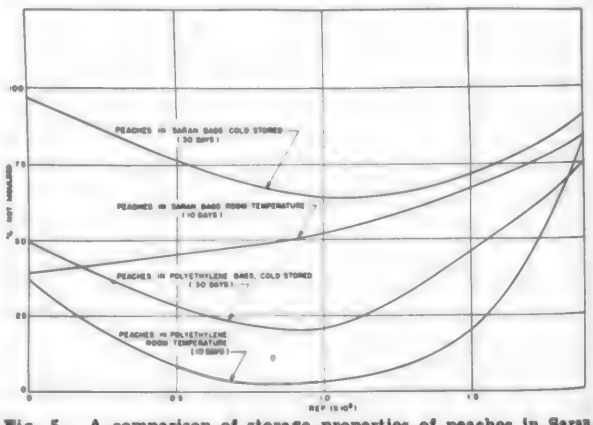

PEACHES IN SARAN BAGS COLD STORED
PEACHES IN SARAN BAGS ROOM TEMPERATURE
PEACHES IN POLYETHYLENE BAGS, COLD STORED
PEACHES IN POLYETHYLENE ROOM TEMPERATURE

Fig. 5. A comparison of storage properties of peaches in Saran bags and polyethylene bags at room temperature and refrigerator temperature. The unirradiated samples in Saran bags stored at 40°F. actually moulded more slowly than the treated samples, even up to 2×10^6 rep.

dose. It is further seen by comparing the bottom two curves of Fig. 4 that the observed moulding phenomena for cherries are approximately duplicated by peaches.

Fig. 5 clearly demonstrates the marked difference in moulding characteristics displayed by fruit in polyethylene bags and fruit in saran bags, both at refrigerator temperature and at room temperature. The unirradiated samples in saran bags stored at 40°F. actually moulded more slowly than the treated samples, even up to 2×10^6 rep.

Conclusions

These studies indicate that at least 1×10^6 rep are required to effect any marked decrease in the rate of mould formation on fresh fruit. Lower doses, in fact, have the effect of increasing the rate of mould formation.

If by increasing the radiation dosage the number of organisms present is decreased, an apparent anomaly exists. One explanation might be that radiation causes a change in the fruit, either physical or chemical, which enables the mould to grow more readily. This effect at lower doses apparently stimulates growth rates to more than compensate for the fact that fewer organisms are present initially. Finally, at higher radiation doses the probability of killing completely all mould organisms on a particular sample of fruit increases, and more and more samples will be free from mould formation regardless of growth-promoting factors. At doses above 1×10^6 rep under most of the experimental conditions studied, radiation definitely retarded mould formation, as compared with untreated samples stored at both 40°F. and 70°F.

At doses above $1{\cdot}5 \times 10^6$ rep undesirable changes have been observed in most fruit, independent of the rate of mould formation. Peaches turn brown; cherries become "mushy"; undesirable "off" flavours develop. Other experiments are in progress to evaluate these effects and their relation to the dose received, and to seek means of preventing their occurrence.

Differences in the rate of mould formation in various container materials seem to depend primarily on the relative efficiency of the materials as gas barriers, the better gas barrier apparently inhibiting mould formation more efficiently.

To summarise, "radiation pasteurisation" of fresh fruit, *i.e.* an effective increase in the satisfactory storage life of the fruit with a radiation treatment substantially less than that required for sterilisation, is possible but only at doses greater than 1×10^6 rep. At these doses certain undesirable changes occur in the fruit which must be studied further. Those packaging materials which present the best gas barrier appear best for inhibition of mould growth.

The Leonard Hill Technical Group

Articles published in some of the associate journals in the Leonard Hill Technical Group this month include:

Manufacturing Chemist. — Materials of Construction; Preparation of Diacetyl; Chelating Agents; Cost Control in the Chemical Industry.

World Crops.—Official Control of Husbandry; The Cotton Industry of India; The Development of Spraying Machinery; Cobalt Deficiency in Pastures.

Corrosion Technology.—Corrosion in the Baking Industry; Corrosion in the Motor Car; Lanolin Rust Preventives.

Atomics.—The Uses of Radioactive Isotopes in Tracing Sewage Flow; Radioisotopes in Industry.

Chemical & Process Engineering.—Automatic Control of Distillation Processes; Chemical and Engineering Research in Australia; Construction of Aluminium Chemical Plant.

Paint Manufacture.—Accelerated Weathering for Paints; Physics in Paint Manufacture; Protective Coatings for Tin; The Fire Hazards of Painted Surfaces.

Petroleum. — Plant Calculations for Petroleum Technologists; Photography in Oil Research.

Fibres (Natural and Synthetic).—Man-made Fibres in the Rubber Industry; Electron Microscope; New Condensation Polymers.

Dairyman. — Principles of the Cheesemaking Process; The Dairy Show at Olympia; Producing Cream without Separators; "Swivel Chair" Milking.

Amino Acids in Beef Muscle

DETERMINATIONS of the amino acid content of fresh and aged raw and cooked meat in extracts prepared from these samples and in the drippings from the cooked meat by the use of microbiological methods, and of various other nitrogenous fractions, are described in a recent paper (*Food Res.*, 1954, **19**, 410).

The content and distribution of nitrogen and of arginine, leucine, tyrosine, histidine, glutamic acid, and lysine in raw and cooked beef muscle, the drippings from the cooked meat, and the non-protein nitrogen (NPN) fraction were determined before and after ageing the samples for two weeks. Amino acid analyses were made on the drippings and NPN fractions were carried out before and after acid hydrolysis.

Ageing in the cut increased the free amino acid nitrogen of raw rib steaks. Cooking caused a marked decrease in the amount of soluble protein nitrogen present and resulted in the liberation of some free amino nitrogen. Only a very small proportion of the total nitrogen present in the raw meat was found in the drippings after broiling. This nitrogen was essentially all non-protein nitrogen, and a fairly high proportion was present as free amino nitrogen.

A greater percentage of arginine, leucine, and tyrosine was found in the drippings and NPN fractions after two weeks' ageing than in the paired steaks that were not aged. Less than 3 per cent. of the total amount of these amino acids in the meat was found in the drippings or NPN fraction. Bound forms of leucine, tyrosine, glutamic acid, and lysine are present in the drippings and NPN fraction of beef.

Up to 31 per cent. of the total histidine was found in the NPN fraction of the samples, and the nitrogen from histidine accounted for approximately 26 per cent. of the NPN in the extracts. On the basis of differential microbiological analysis with carnosine as a reference standard, it was concluded that, in addition to carnosine, other bound forms of histidine were present in the drippings and also in the NPN fractions of beef muscle.

FOOD FOR MAN AND BEAST

Chemists, Biologists and Engineers in Conference at Aberdeen

Fish, seaweeds, distillery by-products, algae, and agricultural, marine and industrial by-products were considered as food for man and beast at the joint conference of the Society of Chemical Industry and the Institute of Biology held in Aberdeen from September 30 to October 2. As well as the reading of papers, abstracts of which are given below, visits were made to the M.O.F. Experimental Factory, the Torry Research Station, and the Rowett Research Institute.

Food for Livestock

IN the first of the papers, J. Duckworth, B.S.A., D.Sc., F.R.S.E., outlined the value of certain agricultural, marine, and industrial products and by-products in livestock feeding, dealing particularly with ruminants.

Most methods of estimating the nutritional value of traditional, new, or potential feedingstuffs fall into one of two classes. In the first of these, nutritional studies are aimed at relating the physiological needs of animals to the capacity of feeds to meet them; in the second come the feeding trials that are test feeds under practical conditions. Research in each class is complementary to research in the other; both are needed for a valid assessment of nutritional value and, hence, of monetary worth. A limit is set to monetary worth by the cost of alternative materials. Straw, straw pulp, fodder cellulose, seaweed, and oat mill feed were considered as energy sources for ruminants. As protein replacements, urea and other simple nitrogen containing compounds were discussed.

In the second part of his paper dealing with non-ruminants, Dr. Duckworth discussed straw pulp and fodder cellulose as energy sources. As protein and vitamin sources, materials from whaling, fishing, slaughtering, oilseed pressing, and fermentation were considered, together with the effects of processing on the nutritive values.

Vacuum Contact Dehydration

Equipment for the vacuum contact dehydration of foodstuffs was the subject of a paper by J. M. Hay, D.Sc., M.I.Mech.E., F.R.S.E. On account of the lower temperatures of vaporisation at reduced pressures, vacuum evaporators and vacuum driers of various types have for long been in use for the drying of thermally unstable material, including certain foodstuffs. Rotary, pan, and plate vacuum driers, designed primarily for other purposes, were used experimentally during the war for the dehydration of cooked, minced, and cubed meat and other foods with some success, but efforts to dry slices or fillets of raw material were not so encouraging.

In recent years the processing of such labile substances as penicillin, streptomycin, and blood plasma has given an impetus to drying by sublimation of ice in frozen material under high vacuum conditions. This method has since been used in the dehydration of meat steaks and other foods in the form of slices producing, without change of volume, a rapidly reconstituting porous product which retains the colour and nutritive properties of the original material to a marked degree.

Vacuum Drying Equipment

The type of vacuum drying equipment described gives a denser product otherwise approximating to that obtained by freeze drying but without the attendant complications of refrigeration and extremely low pressures. Indeed, by modern standards in vacuum engineering, the process might more fittingly be described as drying at reduced pressure. During dehydration, the absolute pressure in the cabinet falls gradually from around 13 mm. Hg to about 2 mm. Hg.

For the investigations in vacuum drying now in progress at the Experimental Factory in Aberdeen, the equipment comprises a fabricated steel cabinet of roughly rectangular form measuring internally 8 ft. 9 in. in length, 5 ft. 6 in. in width, and 8 ft. 4 in. in height. The ends are closed by vacuum tight doors fitted with rubber gaskets. The outstanding feature of the drying system is the arrangement of the 8 ft. by 4 ft. horizontal heating plates; these are grouped in three banks, one above the other, with eight plates per bank. Thus each bank accommodates seven aluminium trays of material with lids of the same dimensions as the plates. The total of 21 trays permits of up to one ton of raw material to be processed per run.

The plates in each bank are suspended by side links from hydraulically operated levers in such a manner that the space between them can be decreased uniformly as the material shrinks, thus ensuring satisfactory heat transfer throughout the process. This system is covered by a patent held by A/S Atlas Maskinfabric, Copenhagen.

Air and vapour are withdrawn from the cabinet and pressure maintained sufficiently low to ensure rapid evaporation at safe temperatures by two water ejectors supplemented by two multi-jet, single stage vacuum augmentors and spray condenser. Normally, only one augmentor is used. This system is simple in construction, but is rather extravagant in steam consumption. Many problems in vacuum contact dehydration of foodstuffs still remain to be solved.

Applications

A second paper on vacuum contact dehydration by E. G. B. Gooding, M.A., M.I.Biol., and E. J. Rolfe, B.Sc., F.R.I.C., was concerned with its application to foodstuffs.

The ideal dehydrated foodstuff should have the following properties: (i) when reconstituted and cooked, the appearance, palatability, and nutritional quality of the freshly prepared vegetable as

usually cooked and served; (ii) rapid reconstitution; (iii) a long storage life under a wide range of climatic conditions; (iv) a high packing density; (v) low processing losses, and (vi) economy in manufacture.

Conventional dehydration methods in which hot air is passed over or through the foodstuff (after appropriate pre-treatment) have certain attendant disadvantages preventing the attainment of the ideal. The size of portion that can be satisfactorily dried or reconstituted is limited, requiring meat and fish to be dried as cooked minces, while vegetables are dried as powders, shreds, dice, or strips of ¼ in. thickness or less. Fats, carotenoids, and certain other substances (*e.g.* ascorbic acid) may be partially oxidised during dehydration in hot air, with the development of rancidity and other off-flavours, and with loss of nutritional quality. Storage life, while largely dependent on the raw material and on pre-treatment is also affected by the drying.

Browning of Foodstuffs

In order to obtain rapid drying and high throughput, the dehydration temperature is normally as high as possible, but avoiding visible heat damage (browning). Even slightly browned material has a greatly reduced storage life at tropical temperatures, and it is probable that even if browning is avoided the relatively high temperature of the foodstuff throughout the drying period (50°-65°C. for five to eight hours) has initiated the reactions which shorten tropical storage life. Further, the minimum moisture contents obtainable by hot air drying methods are limited to equilibrium with air at R.H. 0·1 and reach this only with long and uneconomic drying periods. Some hot air dried products can be compressed into high density blocks by a separate process.

Heat Transfer Difficulties

A big difficulty with vacuum dehydration has been the provision of adequate heat transfer to irregularly shaped materials, but in the vacuum contact plate method the foodstuff is squeezed between pairs of heated plates which move together to maintain contact with the shrinking material during dehydration, giving continuous good heat transfer and, if so desired, compacting the product.

A wide range of foodstuffs of animal or vegetable origin has been successfully dried in large portions, *e.g.* meat in slices of 25 mm. thickness, vegetables in slices, fruit whole (*e.g.* tomato) or in rings or halves. Oxidative damage is negligible. Throughout most of the drying period the temperatures in the foodstuff are substantially lower than during hot air drying; the product usually has a better colour and may be expected to have better tropical storage qualities. In some cases it is porous in structure, with relatively rapid reconstitution.

On theoretical grounds it should be possible to dry to lower moisture contents by this method with absolute pressures below 15 mm. Hg—in practice absolute pressures of 2-3 mm. are obtained. The capital cost of the equipment and steam consumption are high; against this must be set the versatility of the method, and the superiority of the product.

Freezing Fish at Sea

G. C. Eddie, B.Sc., A.R.T.C., A.M.I.Mech.E., A.M.Inst.R., discussed the engineering aspects of freezing at sea.

Roughly half of the fish landed in the United Kingdom is caught on voyages of over 20 days average duration. The fish are stowed in crushed ice; cod can be kept thus for 12 days in reasonably fresh condition and saleable for about 18 days at most. The trawlers spend less than half their life actually catching fish, and on the average the catch is half the available carrying capacity. To return home quickly very high engine powers are used. Quick freezing and low temperature storage can improve both quality and productivity.

Technical success in freezing at sea requires not only suitable plant but also a first-hand knowledge of the conditions on the fishing grounds and an adequate knowledge of the biochemical aspects of the freezing and any subsequent processes. These conditions have rarely been simultaneously fulfilled. Each fishery has its own problems and there is no generally acceptable solution. The mothership with fleet of catchers may not be the best answer, and it is better to experiment with independent freezing trawlers.

New Trawler Designs

Two very different projects are now under way in the United Kingdom. The first is a trawler much larger and completely different in design from the standard vessel, and which will produce, in the main, consumer packs of fillets. The second is a standard trawler equipped to freeze the early part of its catch as whole fish. The benefits of freezing would be greater in bigger ships, but the existing fleet cannot be prematurely scrapped. Frozen whole cod can be handled and processed in all the usual forms by the existing trade.

Large scale handling of frozen fish requires a design of cold store which will not damage fish by desiccation. Experimental cold stores have been erected at Torry Research Station in which very high humidities can be reached. A freezer specially suited for conditions on standard trawlers has been developed; it is robust, simple, and consumes little labour. The whole cod are frozen in large blocks.

The size of the freezing installation on a trawler is fixed primarily by the catching rate. A study of catching rates and their fluctuations on British Arctic trawlers shows that the size of freezing plant can be greatly reduced if fish can be kept for a period before freezing. The prototype freezer was used to produce cod frozen at sea so as to determine the permissible limits of "buffer" storage.

Quality of Sea-frozen Cod

In a paper dealing with the quality of sea-frozen cod, A. Banks, B.Sc., Ph.D., F.R.I.C., described empirical tests employed to obtain the required information concerning the effects of different pre-freezing treatments and of different storage temperatures on the quality of sea-frozen cod. Laboratory tests have been employed,

where possible, and a considerable number of experimental samples have been submitted to trade and consumer tests. The factors which have received most attention are (*a*) the appearance of the thawed fish, (*b*) the texture (which may affect the suitability of the products for normal handling and distribution), (*c*) the flavour, and (*d*) the suitability for smoke-curing.

Laboratory investigations have shown that storage for all times at $-30°$ is essential if sea-frozen cod are to compete at all with good quality iced fish. Icing for a few days before freezing will be possible only if the frozen fish are held at $-30°$. The normal care in gutting and in icing will be necessary for freezing at sea. Fish with some abnormal qualities have been produced by freezing fish prior to *rigor mortis*, but the risk of producing unacceptable products in actual practice, with fish being held in ice for up to a few days, are regarded as slight and no special precautions are being taken to prevent the freezing of "pre-rigor" fish.

The allowable period of icing before freezing has been fixed at three days as a result of laboratory and trade tests. Extension of this period to four or five days would result in the production of sea-frozen fish with a wide range of quality, which would be undesirable. Trade and consumer tests have shown that the products obtained by freezing at sea under the right conditions are highly acceptable.

This paper was prepared as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research, and included a description of work carried out in the Organisation's Torry Research Station.

Fish By-products

Recent developments in the fish by-product industry were described by J. A. Lovern, B.Sc., Ph.D., F.R.I.C. The main fish by-products industry deals with the production of protein feeding-stuffs and oil from processing offal and from fish unsaleable for human food. According to whether the raw material is rich or poor in fat, the industry has developed along somewhat different lines.

Two recent developments are common to both sides of the industry. The first is the introduction of pneumatic (air-lift) driers having relatively low drying temperatures and very short drying times, with high capacity in relation to size of unit. In such driers, the product is blown out of the drier as soon as it is dry and hence light.

The second trend is the increasing interest in alternative products to conventional fish meal. These are peptised products in which the protein has been largely converted into water-soluble fragments. They may either be marketed in the liquid form (dilute or concentrated) or dried. Peptisation may be achieved either by direct addition of some suitable acid, *e.g.* formic acid, followed by a period of digestion, or by ensiling the fish with a fermentable carbohydrate (*e.g.* molasses) and a lactic-acid producing organism. If the product is marketed as a liquid, the acidity is sufficient to prevent putrefaction. Generally, this process is applied to oil-poor raw material, but by heating and centrifuging the oil can largely be removed from oily "silage."

Storage of Raw Material

The efficient processing of oily raw material is particularly handicapped by alternating gluts and scarcities of fish, *e.g.* herrings. Hence there is an incentive to develop some method of storage of raw material. One early process in Britain involved storage in sufficient alkali to prevent putrefaction and permit of subsequent complete peptisation of the protein and recovery of oil—in some ways analogous to the "ensiling" techniques. This method has disadvantages which have led to its discontinuance, and currently such preservatives as formaldehyde and sodium nitrite are being studied and increasingly used. An alternative to preservation of the raw material is preservation of a half-processed commodity such as press-cake.

The seasonal nature of certain fisheries and the migratory habits of the fish, *e.g.* herrings, have led to many proposals for floating oil and meal factories. The economics of this are far from simple, but development along these lines is in progress in certain areas. Processing of oily material usually involves the expression of about half the total water along with the oil. There are certain advantages in expressing part of the water from non-oily material also, but in both cases losses of dissolved and finely suspended material are serious if the expressed fluid is discharged to waste.

In some countries, *e.g.* U.S.A., the fluid is concentrated and marketed as a special product, "condensed fish solubles," but the present trend in Europe at least is to return the material in some form to the final meal.

Certain otherwise highly efficient types of drier, *e.g.* the flame drier, have in the past been operated without any attempt to deodorise the large volumes of effluent vapour. A modern development is the designing and increasing use of water-scrubbing plant for driers of this type. However, the introduction of pneumatic (air lift) driers, with enormously increased amounts of effluent air, has brought with it a new problem if deodorisation is found to be as necessary as with other types of drier.

This paper was also prepared as part of the programme of the Food Investigation Organisation of D.S.I.R.

Distillery By-products

The recovery and use of distillery by-products as animal feeds were the subject of a paper presented by C. J. Jackson, O.B.E., M.Sc., Ph.D. The production of whisky is based on traditional methods which have been utilised for centuries, and although technical advances have been made in the malting, fermentation, and distillation processes, little attention has been paid to the recovery or utilisation of by-products. The reason for this is probably two-fold: (i) the disposal of effluent has only become an accepted problem since about the beginning of the century, and (ii) the value of the by-products as animal feeds has only recently been recognised, largely as the result of the rapid

advances achieved in the field of animal nutrition.

Apart from carbon dioxide, the by-products consist of the residual grains after the mashing process and the soluble and insoluble solids contained in the spent wash. The effluent problem may be tackled by the partial or complete removal of the soluble and insoluble solids. Conversely, by-product recovery is the removal of the solids from the spent wash.

After the repeal of prohibition in the United States, the recovery of by-products became an integral part of whisky production and the standard method of solving the effluent problem. The universal shortage of feedingstuffs brought these materials into prominence in the United States during the war years, and over the last ten years there has been an average annual output of over 300,000 tons.

The recovery methods employed in Britain and the United States are similar. The grains are obtained either from the mash tun or screened from the spent wash, the insoluble solids are removed from the spent wash either by fermentation or centrifugal separation, while the total solids are recovered by evaporation of the spent wash. The grains, when dried, are similar in composition to palm kernel cake and the dried solids, which contain substantial quantities of protein and the vitamin B complex, are similar to dried skim milk.

In the United States, the Distillers Feed Research Council has sponsored extensive work to determine the nutritional value of and the best use for these by-products. Their recent work indicates that these by-products are a valuable source of unidentified growth factors in addition to protein and vitamins. Similar investigations are now being carried out in Britain, and there appears to be little doubt that these materials are of at least equal value.

Seaweeds as Foods

From time immemorial man has utilised seaweeds for food, while in certain coastal areas animals have depended almost entirely on seaweeds as their source of food. Despite the fact that the nutritive value of seaweed meal, and seaweeds generally, has repeatedly been examined in a number of countries, the results are not in accord. It is generally agreed, however, that seaweed is an unbalanced foodstuff, low in proteins which are not readily utilised, high in mineral matter and, in addition, containing substances known to have a laxative effect. Consequently it should be regarded as a supplementary foodstuff which can only be fed up to a certain percentage of the basal diet; at this level it is often difficult to assess its true value. This aspect of the use of seaweeds as a source of food was discussed by W. A. P. Black, B.Sc., Ph.D., F.R.S.E.

The availability and the factors affecting the chemical composition of the brown seaweeds, and consequently their nutritive value, were outlined, and a brief review given of the trials carried out in other countries to try to assess their nutritive values. In Britain, trials have been carried out under the auspices of the Institute of Seaweed Research. Rats have been used to estimate the biological value of the proteins and the nutritive value of the individual constituents; sheep and pigs to determine digestibility coefficients, and, in addition, group comparison feeding trials have been carried out with pigs.

With dairy cows the utilisation of the constituents by the rumen bacteria and the effect of feeding seaweed meal on the milk yield and the butterfat content have been studied. With chickens the use of seaweed as a source of vitamins has been investigated and trials carried out with one-year-old pullets to find out the maximum amount of seaweed which can be introduced into their diet without upsetting their metabolism.

Algae as Food

The final paper of the conference, dealing with the large scale culture of microscopic algae as food, was given by G. E. Fogg, B.Sc., Ph.D., M.I.Biol. The photosynthetic efficiency of normal agricultural methods is rather low, and the amounts of food produced by them per unit area are considerably below those theoretically attainable. Although they are not intrinsically any more efficient than conventional crop plants, high photosynthetic efficiencies are more easily achieved and maintained with microscopic algae, and the idea of using these organisms for the large scale production of food or industrially useful organic matter is an attractive one.

Chlorella Culture

Large scale culture of *Chlorella* has now been carried out in America and Japan, but it appears that the costs are too high for it to compete with normal agricultural methods under present conditions. However, it is to be expected that further improvements in the efficiency of the utilisation of light will be made and certain constituents of microscopic algae may prove valuable enough to make their culture an economic possibility.

Photosynthetic treatment of sewage by means of algae has been found to be practicable and economic; if carried out on a large scale it would result in the saving of valuable plant nutrients that at present go to waste and the production of considerable amounts of material useful as cattle food or fertiliser. Microscopic algae are most valuable as a source of protein and contain sufficient quantities of all the essential amino acids except methionine.

A Year's Standards

No fewer than 2,500 British Standards current at March 31, 1954, are listed in a recently published yearbook* in which is included a brief description of the subject matter of each.

British Standards under which the Institution's certification trade marks are used are listed beneath the following headings: Electrical; Building; Plastics; Bedding and Furniture; Personal Safety; Miscellaneous.

Containing over 500 pages, the yearbook will enable those concerned to keep up to date with the increasing momentum of practical standardisation and simplification.

* *British Standards Yearbook, 1954.* Pp. 507. British Standards Institution. Price 12s. 6d.

Emulsions and Emulsification

SINCE the publication of Dr. W. Clayton's small volume of 160 pages on the theory of emulsions and emulsification in 1923, the first of its kind in the English language, three more editions have been published, the last in 1943. The fifth edition, from the pen of Dr. C. G. Sumner, has now been published and will be particularly welcome since the earlier editions have been out of print for some time.*

This latest volume, occupying nearly 700 pages of print and illustrations, includes the names of about 3,500 different authors, some of whom, such as McBain and Lewis, are given no less than 27 separate references each.

Dr. Sumner is to be congratulated on his work, and it is a sign of the times that industrial research chemists can initiate and develop works of this nature dealing not only with the fundamental physical chemical problems involved, but also with the various types of apparatus and plant used in commercial manufacture.

In the earlier editions, Clayton realised that foams were merely one aspect of emulsification and included foams, their formation and inhibition, in the work. Sumner, while retaining the original title of the volume, has expanded this relationship between foams and emulsions.

In some respects this is a pity; while the production of foams is important for fire extinguishers, beer, cosmetics, ice cream, and the like, the destruction of foams in distillation and other manufacturing processes is most important and one would have liked to see rather more space devoted to this aspect. The problem of breaking a foam is generally distinctly different from that of breaking an emulsion, but this will depend on the type of foam. In the case of ice cream, foam breakdown is similar to that of an oil-in-water emulsion, but the situation is not the same when the foam is produced in a vacuum pan.

A very interesting section is devoted to the continuous production of butter, and it remains to be seen whether similar processes can be developed for other "natural" products. Attention is drawn to the work of Hillig and Ahlmann, who showed that butter obtained by the continuous process contains appreciably more butyric acid than that produced by the ordinary churn method; this will doubtless have to be borne in mind in interpreting the results of the Reichert process for testing butter.

Although the book is largely theoretical, readers without a profound knowledge of theoretical physical chemistry need have no fear; because of the simple explanations given the meaning of such terms as rheology and thixotropy are readily understandable. In mentioning thixotropy, it may not be out of place to point out a slight historical mistake in this connexion. Freundlich admittedly suggested the use of the term thixotrophy to T. Peterfi (*Arch. Entw. Mech. Org.*, 112, p. 660), but in 1927, not in 1935.

There are few food products in which the subject of making or breaking of emulsions and foams does not occur and there can be no better source of fundamental information than that given by Dr. Sumner.—T. McL.

* *Clayton's The Theory of Emulsions and their Technical Treatment.* Revised by C. G. Sumner, M.Sc., Ph.D.(Man.), F.R.I.C. Fifth ed. Pp. 669–viii. J. and A. Churchill. Price 72s.

Spices through the Ages

IT SEEMS barely possible that within the compass of some 200 pages could be provided a history of the world linked with a history of spices which, in ancient times, ranked with precious stones in the inventory of royal possessions. But such a feat has been achieved by the author of a recent book* who gives an interesting account of the progress of spices from the time of primitive man "attracted to the spice plants by their alluring scent," to their present-day status in packet form on the shelves of the grocer's shop and the housewife's larder.

In the course of 17 chapters, he tells how spices were first monopolised by the few, how they determined the wealth and policies of entire nations, how they served as an incentive for the discovery of new waterways and continents, and the importance of their role in ancient medicine.

In the food manufacturing industry, spices have a most important place. The industry has produced a great variety of cooked and semi-cooked foods, pickles, sauces, and soups which are dependent on spices for flavour. Among the flavouring extracts there are many made from the essential oils of the spices, including anise, basil, cassia, cinnamon, celery, cloves, ginger, nutmeg, mint, marjoram, and thyme.

Of no less importance is the role of spices, or their volatile oils, in the manufacture of liqueurs and cordials; aniseed, coriander, fennel, cloves, nutmegs, mint, ginger, and cumin all find use in the manufacture of a wide range of beverages such as absinthe, curacao, benedictine, kummel, and gin.

In his epilogue, the author outlines his views on the future of the spice industry, and mentions the impetus given to the manufacture of artificial and imitation spices as a result of the Second World War, but these can in no way take the place of the full flavour of Nature's products whose history is as old as the world itself.

A useful appendix gives the nature and origin of the fragrant and pungent products found in the warehouse of any modern spice merchant, the common names of the spices, and the plant families to which they belong.

* *The Story of Spices.* By John W. Parry. Pp. 208+viii. Chemical Publishing Co. Price $4.50.

FUTURE ARTICLES

AMONG the articles to be published in forthcoming issues of FOOD MANUFACTURE are the following: "Pineapple Canning in Kenya," "*p*H Measurement in the Food Industry," "Frozen Concentrated Fruit Juices —2," and "Starch Filled Confections."

Frozen Concentrated Fruit Juices–1

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Principal Research Officer, C.S.I.R.O., Division of Food Preservation, Homebush, N.S.W.

Frozen concentrated fruit juices have achieved unprecedented popularity in the United States since the war and the growth of the frozen concentrate industry is one of the most spectacular developments in food manufacture. Here is a convenient review* of the voluminous literature on the subject, containing over 160 references. Most of the review is devoted to frozen concentrated orange juice because this is the biggest single product of the industry, accounting for no less than one-third of all frozen food sales in the United States. The review commences at the concentration stage because the earlier steps in the process are in general similar to normal practice in canning single-strength fruit juices.

FRUIT juice concentration did not begin with the advent of the frozen concentrate industry; it was already a well-established field of food technology, using a variety of batch-type and continuous vacuum evaporators, operating with product temperatures in the range 100° to 150°F.[1-7]

Citrus juice concentrates are widely used in the U.S.A. in soft drinks. During the war years, the industry expanded considerably when America supplied large quantities of orange concentrate to Britain for use in soft drinks and as a source of vitamin C for infants and mothers. Later, concentrates for these purposes were largely supplied by Palestine.[8]

These end uses did not make great demands on the quality of the concentrate. In soft drinks, flavour deficiencies were masked by added flavourings, and in Britain the product was regarded more or less as a medicine. The applications of concentrates were restricted to these fields because they suffered from two serious flavour defects:

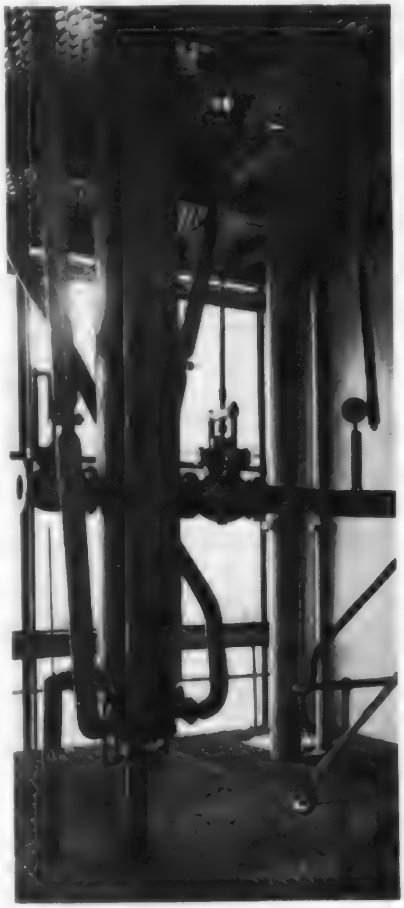
1. Cooked or scorched off-flavours caused by heat damage during concentration.
2. Lack of character because of loss of volatile flavouring ingredients.

The frozen concentrate industry has become possible only because of major contributions to the solution of both these problems.

Minimising Heat Damage

The extent of heat damage to flavour during fruit juice concentration is determined by the temperature and time of heating. The trend of modern practice is therefore towards low-temperature evaporation in continuous systems with the shortest possible transit time for an increment of juice through the evaporator.

Very little fundamental data appear to be available on the temperature limits for juice concentration without heat damage. Rector[9] claims that orange juice has been successfully concentrated with the product temperature as high as 110°F., and the heating medium at 180°F. This is contrary to the published results of workers in his own organisation, the General Foods Corporation, who found[10] that 95°F. was the upper limit to the product temperature for avoidance of cooked flavours and that 77°F. gave a better product than 95°F. These findings are in line with the statement of Atkins, Wenzel, and Moore[11] that, in recirculating systems, the juice flavour was not materially affected provided the product temperature did not exceed 80°F. and the temperature of the heating medium did not exceed 110°F.



Kestner multi-circulation evaporators for the production of concentrated fruit juice.

Littlefield[7] states that grapefruit juice is concentrated at 100° to 102°F. without developing a cooked flavour.

Pineapple juice has been stated[12] to be equally as sensitive as orange juice to overheating, but some other juices assume cooked flavours less readily. Walker, Nimmo, and Patterson[13] examined the effect of concentration temperature on the flavour of apple juice, using a batch-type evaporator with recirculation, in which the evaporating period was approximately three hours. With average product temperatures up to 135°F. and jacket temperatures up to 185°F. there was no change in flavour provided local overheating was avoided, but a product temperature of 150°F. with jacket temperature 200°F. did cause a significant change in flavour. Grape juice can be concentrated satisfactorily at 100°F.[14] and perhaps as high as 140°F.[12]

The requirement for short transit times through the evaporators

* Presented at the Fifth Annual Australian Canning Convention.

demands high rates of evaporation, which have been achieved in practice by exposing the juice in thin films moving with high velocity over the heat transfer surfaces. This requirement places an upper limit on the solids content to which fruit juices can be concentrated economically, without loss of quality. As the solids content increases to about 50 per cent., the evaporation rate drops steeply because of increasing viscosity, which reduces the rate of heat transfer, and because of the effect of the rise in boiling point.[15] With orange juice, 60 per cent. solids appears to be the upper limit for satisfactory concentration without heat damage.[10, 16] Walker and Patterson[17] report that the evaporation rate of apple juice drops sharply above 40 per cent. solids.

Types of Evaporators

A number of low-temperature, high-vacuum, continuous evaporators have been designed specifically to meet the critical requirements for fruit juice concentration for freezing. In this connexion, "low-temperature" refers to product temperatures of the order of atmospheric temperatures, or, more specifically, temperatures in the range 50° to 75°F. rather than 100° to 150°F. as in earlier practice.

This lowering of operating temperatures introduces engineering problems in the removal of water vapour.[12, 18] To condense the water vapour at the pressure of the system (10 to 30 mm. Hg) requires a refrigerated condenser. Alternatively, the vapour may be compressed to a higher pressure and temperature, then condensed in a barometric condenser or used to evaporate more juice. Both refrigeration and re-compression systems are used in fruit juice evaporators and both may achieve high thermal efficiency.

In evaporators so far designed for the frozen concentrate industry, vapour re-compression has been accomplished by the use of steam-jet boosters, but mechanical compressors have been used on fruit juice evaporators elsewhere, notably in Switzerland.[1, 19]

Additional economies in the use of heat in evaporators can be obtained by applying the multiple-effect principle. In a series of evaporators (often three), the vacuum is increased successively along the series and hence the evaporating temperature becomes successively lower. It is then possible to use the vapours from the first effect to heat the second effect, and the vapours from the second effect to heat the third.

Low operating temperatures in evaporators permit a further modification in design as compared with earlier practice. It is no longer necessary to operate with flooded calandrias to avoid "burning on" of the product on the tubes. Thus most of the evaporators of recent American design are of the "falling-film" type; the juice is fed to the top of the tube-nest which forms the heat exchanger, and is distributed so that it flows down the internal walls of the tubes in thin films.

Schwarz[20] has classified the evaporators in use in the frozen orange concentrate industry in the United States of America into three types:

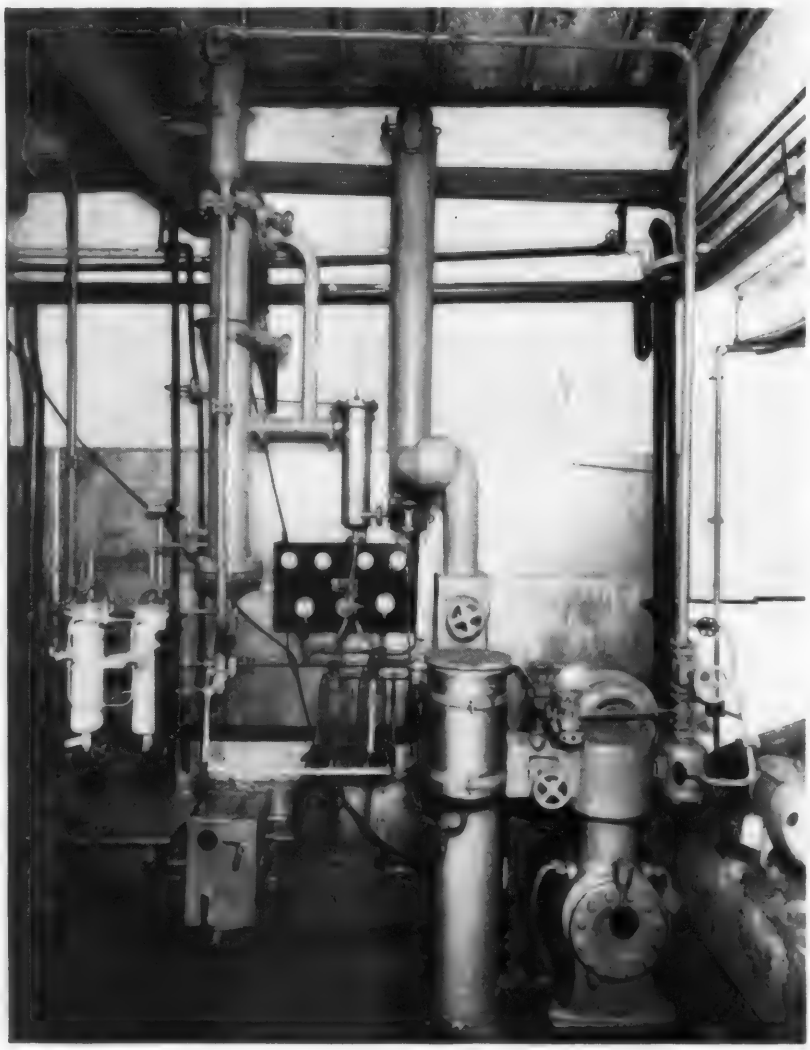
1. Single-effect, single-pass.
2. Single-effect, with recirculation.
3. Multiple-effect, with recirculation.

These types may be further subdivided according to whether the system used for the removal of water vapour is a refrigeration cycle or a steam re-compression system.

Some evaporators of other than American origin may also be fitted into this classification.

Single-effect, Single-pass Evaporators

The two evaporators at one American plant visited by the author were vast monuments in stainless steel. Designed by



Kestner Patent Coolcentrator for the production of concentrated fruit juice.

Vacuum Foods Corporation Evaporators, one consisted of 13, and the other of 14, jacketed towers, each 30 in. in diameter and 27 ft. high, connected to vacuum manifolds. The orange juice flowed down the internal wall of each tower in succession, increasing in concentration in steps of about 3°B. up to a final solids content of 50°B. The juice temperature did not exceed 60°F. and the vacuum was maintained at 15 to 17 mm. Hg by multi-stage steam ejectors. The steam from the ejectors and the vapours from the towers were condensed in a barometric condenser, providing warm water at 100° to 101°F. which was circulated as the heating medium in the jackets of the towers.[16, 21, 22]

These evaporators were thus single-effect in type with a single pass of 13 or 14 stages. With a low juice temperature and a transit time of only six minutes, they gave a high quality concentrate with minimum heat damage and some retention of volatiles. But the initial cost and operating costs were high and they have been superseded by other types.[20]

The Kestner triple-circulation evaporator is essentially a single-effect type with a single pass of three stages.[5] It differs from the American evaporators in that the juice is fed to the bottom of the tube-nest instead of the top, thus creating a so-called "climbing film." An evaporator of this type is in operation in Tasmania concentrating apple and berry juices at temperatures of 104° to 113°F. and transit times of about three minutes.[23] The Kestner Evaporator Co. is now reported[24] to have designed an evaporator called the Coolcentrator, operating with a product temperature of 70°F. and using an ammonia refrigeration cycle to remove water vapour and to heat the product.

An evaporator of Swiss design, Luwa (Turba-Film) evaporator, is a single-effect, single-pass evaporator employing mechanical means to obtain a thin turbulent film of product on the heat transfer surface, and hence high evaporation rates and short transit times.[25, 26] It consists of a vertical jacketed cylinder with a central rotor carrying vertical fins which rotate with a clearance of $\frac{1}{32}$ in. from the heated wall. The rotor extends into a vapour separator immediately above the evaporator and there the rotating fins minimise entrainment and foaming. Single units have capacities up to 2,500 lb./hr. of water evaporated. In a Canadian installation,[27] a Luwa evaporator is reported to be concentrating apple juice to 60° to 70°B. with a product temperature of 110°F. and a transit time of 20 seconds.

One of six Blaw Knox Buflovak low temperature double effect evaporator installations producing orange concentrate for a well-known American food firm.

Single-effect Evaporators, with Recirculation

At another American plant, the Florida Citrus Canners Co-op., at Lake Wales, is installed the prototype of the Mojonnier Lo-Temp. evaporator, which has received much publicity because of novel features in design, and has been widely used in the industry.[28-34]

The Mojonnier evaporator is again a single-effect type, but in this case concentration occurs in three passes with some recirculation at each stage. Each pass consists of a vertical tube-nest of 3 in. stainless steel tubes. When juice flows down the tubes, ebullition occurs under the high vacuum (10 to 20 mm. Hg) and a mixture of liquid and vapour flashes out into a vapour separator. The vapour moves through a manifold to a condenser, while the juice goes to the next stage or is recirculated. With orange juice, the solids content increases from an initial figure of 8° to 13°B., to 20° in the first pass, to 40° in the second, and to 60° in the third. The juice temperature is 50° to 70°F. and the transit time is stated to be only four minutes.

The essentially novel feature about this evaporator was the fact that it was designed on the heat pump principle using an ammonia refrigeration cycle. A refrigerated condenser containing ammonia at 45°F. condenses the water vapour evolved, and ammonia at 105°F., on the hot side of the cycle, is used as a direct heating medium for the juice in the tube-nests.

This particular plant has been very fully reported on and illustrated in the literature,[4, 35-39] and

a number of other installations of Mojonnier evaporators for orange juice concentration have also been described.[40-44]

Pilot scale evaporators of the single-effect, single-stage, recirculating type have been described by Walker and Patterson;[17] Rice, Keller, and Beavens;[45] and Carleton and Curtis.[46]

Water Vapour Removal

A second evaporator of the same general type is the F.C.C. (Florida Citrus Commission) evaporator designed by Atkins, Wenzel, and Moore.[11] This evaporator incorporates the same general components as the Mojonnier equipment: falling-film tube-nest heaters, vapour separators, and recirculating pumps.

The Model A pilot scale unit having an evaporating capacity 700 lb./hr. was 2-stage,[11] but commercial units were made 3-stage with capacities from 6,000-33,000 lb./hr. of vapour removed.[47-49]

The F.C.C. evaporator incorporates the technique of water-vapour removal by steam-jet recompression. The vapours from the separators are passed through a steam jet booster to become the heating medium for the juice in the tube-nests and associated preheaters. The juice temperature is approximately 70°F. and the solids content increases in the three stages to 18°, then to 29°, then to 55°B.

Subsequently, a Model B unit of modified design was described[48, 49] and claimed to have a number of practical advantages, including adaptability to small production (evaporation capacities of 200 lb./hr. and upwards). In Model B, the tube-nest, the vapour separator, and a concentrate collection cone are all connected to a large central chamber. The pilot model (single-stage, 20 lb./hr. vapour removed; heated by vacuum steam) concentrated orange juice without loss of quality at juice temperatures from 60° to 85°F. and heater temperatures from 80° to 160°F.

These favourable results may all be attributed to rapid circulation of the juice through the heater. The commercial Model B (2-stage, 6,000 lb./hr. vapour removed) incorporates the steam recompression system.

Multiple-effect Evaporators, with Recirculation

The Carrier-Howard evaporator is made up of the basic components: falling-film tube-nest heaters, vapour separators, and recirculating pumps, and it utilises a refrigeration cycle; but it departs from the evaporators already described in being triple-effect. The first effect is heated by warm water (90° to 100°F.); the vapours from the first effect heat the second effect; the vapours from the second effect heat the third effect; and finally the vapours (50°F.) from the third effect are condensed by water (40°F.) cooled by a refrigerant (Freon 11 or ammonia). Hot water from the condenser on the hot side of this refrigeration cycle provides the heat for the first effect. This system differs from the Mojonnier system therefore in using water as an intermediate heat transfer medium rather than the refrigerant itself.

Kelly[50] in the first published description of this evaporator states that the juice is fed to the first effect, but Hopkins and Walker[51] describe a later installation in which the flow of juice is in the "backwards" direction; the juice (approx. 12°B.) enters the third effect where it is concentrated to 16° to 18°, then to 27° in the second effect, and to 58°B. in the first effect. In this way the material of highest viscosity is handled at the highest temperature, *i.e.* the greatest temperature difference is applied when the heat transfer coefficient is low. The juice temperature ranges from 50° to 75°F. and the final vacuum is 29·6 in. Hg.

These evaporators are being used for concentration of orange juice,[50-53] lemon juice,[56] and pineapple juice.[57]

A Buflovak evaporator is a double-effect evaporator essentially similar to the Carrier-Howard unit, incorporating an ammonia refrigeration cycle, and operated on the backwards-feed principle.[20, 58-59]

Comparison of Evaporators

Schwarz[20] has made a useful critical comparison of the characteristics of the various types of low-temperature evaporators. He concludes that for a given capacity the multiple-effect evaporators are lowest in initial cost and in operating costs, but they have certain practical disadvantages. They will not operate satisfactorily unless material is circulating through all the effects, so that they are more difficult to start up and shut down than single-effect evaporators. The likelihood of heat damage is greater in multiple-effect evaporators since the transit time may be of the order of 30 minutes, and also because considerable quantities of highly viscous product are circulated in the first effect where the temperature is high.

The relative merits of steam re-compression and refrigeration-cycle systems for the removal of water vapour are discussed by Schwarz[20] and by Hellier and Weingartner.[18] The choice of a system for a specific plant must depend on many factors, *e.g.* the relative costs of electrical power and steam, the availability of cooling water and of facilities for the disposal of waste waters, and other factors related to the economy of the plant as a whole.[19]

Entrainment

An important factor to be considered in assessing the efficiency of evaporators is loss of concentrate by entrainment in the vapours, which may attain high velocities. In one plant serious losses were largely overcome by the installation of vapour separators of special design.[60]

Automatic Control

The efficient and economical operation of the evaporators described depends largely on the use of automatic controls for most of the operating variables. For instance, Slater and Fehlberg[61] report that two evaporators, each removing 14,500 lb./hr. of water from orange juice, are supervised by one operator. The temperature and the liquid levels in the three stages and the Brix of the concentrated juice are controlled automatically.

Two types of Brix controller are in use in the industry: one based on density measurement,[61] the

other on measurement of boiling-point elevation. The first is more accurate and reliable but also is more expensive.[20, 58]

Sanitation

Because of the need to maintain high microbiological standards in the final product, requirements for sanitation and ease of cleaning and inspection have strongly influenced the design of evaporators and other plant for the preparation of frozen concentrates. Schwarz[20] discusses some of the principal hazards, from the point of view of sanitation, in the design and operation of evaporators. Lactic acid bacteria multiplying in evaporators have caused spoilage in frozen concentrates.[62] Beisel[63] presents a practical sanitation programme for a frozen concentrate plant, and Brokaw[64] reviews sanitation practice in the industry.

Concentration by Freezing

Brief mention should be made of the process of concentration by freezing, *i.e.* the removal of water from fruit juices as ice rather than as vapour,[3, 65, 66] which avoids the problems of heat damage and loss of volatile flavours.

Kaufman and Campbell[10] found that concentrates prepared by freezing were significantly superior in quality to those prepared by evaporation.

Since the author's visit to Florida in 1947, when there was one plant using the freezing concentration process to prepare frozen orange juice concentrate, it is evident that the process has not gained any ground in competition with vacuum evaporation. Freezing in several stages is necessary to reach high solids contents, and it is difficult to avoid loss of solids in the ice.

Some small organisations in the United States of America and Canada are reported to be producing apple juice and berry juice concentrates by freezing,[67-69] and Cruess and Gibson[70] have described experimental packs of apple juice and prune juice concentrates, also concentrated by freezing. Heiss[71] describes recent German work on frozen concentrates from blackcurrants and a number of other fruits.

(*To be concluded*)

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Flavour in Strawberry Purée

INVESTIGATIONS to determine the effect of sugar and ascorbic acid in the retention of natural colour and flavour and in the prevention of off-flavour development in strawberry purées have been carried out by D. G. Guadagni of the Western Utilisation Research Branch of the Agricultural Research Service, U.S.D.A. (*Food Res.*, 1954, **19**, 396).

Purées for these experiments were prepared from high quality local fresh strawberries which were capped, washed, drained, and thoroughly mixed to ensure uniformity.

The results showed that deteriorative changes in the quality of fresh purée occurred within two to three hours at room temperature and that sucrose in a (4 : 1) ratio neither prevented nor minimised these changes. In frozen purées, the addition of sucrose or ascorbic acid offered no advantage in respect of quality retention during freezing, storage, and defrosting.

Alaska Salmon Canning

Because of the high labour costs that canners of Alaska salmon have always had to face, it has been imperative for them to develop machines eliminating all hand work. A number of machines have been developed for this purpose but, until recent years, all aimed at the reduction of hand work rather than the improvement of quality.

AFTER World War II, Pacific American Fisheries of Bellingham, Washington, made a survey indicating that many consumers found objectionable the skins and bones contained in cans of salmon. Laboratory research revealed that the skins had an odour and flavour not associated with canned salmon, while salmon bones, canned separately, tasted like chalk. Furthermore, skins and bones accounted for almost 15 per cent. of the weight of canned salmon.

The company reasoned that, if it could eliminate the backbone and the skins, it would have a product of a better flavour with the cheaper varieties of salmon, comparing favourably with choicer varieties packed with skin and bones. It was considered that such a product, consisting wholly of salmon meat, could command a higher price.

Accordingly, the company developed five sets of salmon skinning and boning machines which produced a pack of 60,000 cases in 1947 and larger packs in the ensuing years. The skins are being tanned and made into salmon leather, suitable for use in the manufacture of such articles as purses. The grain of the leather is attractive and the scale pattern is non-uniform, making it almost impossible to duplicate on a platten die.

Handling the Catches

Fishing boats bring their catches of salmon to the cannery dock, where they are unloaded on to an elevator which conveys them into the cannery where they are first weighed, then routed by overhead conveyor to the fish storage bins. Workers sort the fish from the conveyor into respective bins according to the size and type. From these bins, the fish are flumed to the hopper for the beginning of the process.

Eviscerated fish go from the iron chink to the sliming table where workers remove what has been missed by the machine, including the aorta.

The fish are automatically positioned by the Foonken indexing device, one operator providing a constant supply of fish from the hopper while another positions the fish on a chain conveyor moving across the plate under the indexing fingers. As each fish is moved toward the "guillotine," an indexing finger slides along its body, applying sufficient pressure so that when it reaches the fish's gill it engages with the gill bone and positions the fish so that the guillotine severs only the head, with the gill bone attached, from its body and does not cause any of the edible part to be lost.

Working of the Indexing Fingers

There are five indexing fingers moving on an elliptical track. After positioning the fish, the finger recedes from the knife and moves around its track. In combination with two iron chinks, these two machines can accommodate a flow of 9,000 fish an hour.

It is difficult to say how great a saving is possible with this device; a good butchering crew, when fresh, probably can attain results equally as good. When fatigue is encountered on long shifts, however, wastage results. Some observers credit the Foonken with saving a minimum of 7 per cent. of the flesh formerly cut off by other beheading devices and all applaud its safety features.

An operator next takes the headless fish from the exit side of the indexing machine and feeds them, tail first and belly up, into the iron chink's feed trough. The bull wheel, in the centre of this machine, acts as a conveyor for the fish and moves them past knives, saws, brushes, and water sprays which automatically remove tails, fins, and viscera, at speeds up to 72 fish per minute.

The eviscerated fish are conveyed to the sliming tables where workers remove other viscera, missed by the iron chink, includ-

Salmon skins are salted (*left*), then stacked overnight (*right*) before being barrelled for curing as leather.

ing the large aorta artery. These workers wash the body cavities of the fish and place the fish on a conveyor leading to the bin from which they are drawn to feed the PAF fish boning machine.

The Boning Machine

The backbone of the salmon is all that need be removed since the small rib bones are not noticeable in canned salmon. This boning machine comprises a revolving cutter head, about $\frac{1}{2}$ in. in diameter, and two circular knives. The operator positions the fish by placing the belly flaps over the vertical steel indexing rail. As a lower knife splits the ventral side, endless spiked chains, running directly beside the vertical rail, grasp the fish when the spikes puncture the skin near the backbone and move it toward the cutter head. Thus indexed, the fish moves on this rail toward the cutter head and the backbone is cored out without loss of any flesh.

As the backbone emerges through the centre of the cutter head, it is grasped by two revolving corrugated wheels which serve to pull it through the cutter and eliminate the danger of tearing by the spikes. The bone is flumed by pipe to the refuse bin. Simultaneously, as the backbone is being cored from the fish, a circular knife splits the dorsal, completing the separation of the two loins. The loins drop on to twin, endless belt conveyors and move to the PAF skinning machine.

The operator of the skinning machine places two salmon loins skin on the feed plate, positioning them so that the tails of the loins protrude over slots made in the plate. The main cylinder of this machine moves upward from this plate. It is equipped with four sets of pneumatically operated clamps, which are open and which protrude from the cylinder as they reach the feed plate; they are adjusted so that the jaws will close on the salmon loin tails as the cylinder revolves them past the feed plate slots. The clamps then recede into the cylinder and the fish loins are then moved past a reciprocating knife or band knife, set at skin thickness above the cylinder, and the skins are cut from the flesh. As the cylinder revolves to a position adjacent to two receiving belts, the jaws open, releasing the skins, and the loins drop on to the conveyors. The cylinder revolves so that the clamps reach the lowest position where a blast of compressed air blows off the skins; these fall on to another conveyor and move to the station where they are barrelled in brine. The skinned loins are conveyed past inspectors, when any adhering skin is removed.

Filling or Storing

The loins may be conveyed direct to the automatic filler or they may be stored for a short time, either in stacks 6 in. deep on the conveyor, or in a bin. This conveyor can be controlled from the filler end.

At the filler, the loins are placed two-deep on a revolving chain from which, depressed by spring-operated steel prongs, they are moved by a rotary rake on to a grill. A sliding rake then pulls the loins into the 15 band knives, the distance between which ($1\frac{3}{4}$ in.) is determined by the $\frac{1}{2}$ lb. can for which they are intended.

From the knives, the fish fall into buckets on a bracket chain which travels at intervals determined by a timing sprocket. As the buckets move away from the knives, hydraulically operated push forks enter each bucket and force the fish into a "twist" tunnel. When loins are being canned, this tunnel's function is outmoded. When a pack of conventional type is going through the line, however, this tunnel twists the fish so that the skin is at the sides rather than the top, improving its appearance in the can.

From the tunnel, the fish is pushed by a tumblefork into a measuring box on a rotary unit, where a knife slices off the proper portion of fish. The can, containing the desired amount of salt, enters the rotary unit from another direction and is positioned below the measuring box. An oval-shaped vent knife with a hollow groove on the outside slides down the inside of the can just before a plunger drives down the fish. Air thus escapes up the groove in the knife, facilitating filling.

Weighing and Clinching

After passing through a cold water spray under 80 lb. pressure, the cans enter the weighing machine, which consists of a number of individual scales. If the can is too light to depress the scale to the proper level, a delayed-action ejector sends it into a "light" line as the can leaves the machine. In the case of a 1 lb. can, "light" cans are those weighing $15\frac{7}{8}$ oz. or less. Enough fish is added by hand to correct the deficiency. The weighing machine does not detect overweight cans, this being the responsibility of the inspector.

Next on the line is the clincher machine, where the tops are attached after they have been embossed with the can code. This curler clincher rolls the top over the edge of the can just enough to hold it on, without fitting it on so tightly as to prevent air escapement in the vacuum machine. If this top can be twirled around on the can after it has been clinched, the machine is working properly. As another test, a steel ring is dropped over the top of an occasional can. If this ring goes over the top without sliding too far down, the clinching is satisfactory.

Sealing the Cans

After further washing, the cans enter a rotating valve on the vacuum machine. This valve times the entry of the can into the vacuum chamber without disturbing the vacuum. A 25 in. vacuum in the chamber produces a 12 in. vacuum in a 1 lb. can. Should the vacuum in the chamber fall below 18 in., the machine automatically shuts off.

The cans are hermetically sealed in one of three seaming heads in this chamber. Each head performs two operations, the first rolling the cover flange under the can flange and the second tightening the roll. The can "hook" and cover "hook" each measures from 0·0075 to 0·0085 in. thickness, and the seam they form is from 0·0052 to 0·0058 in. thick. Every 30 minutes, a can is tested for vacuum with a hand gauge.

The capacity of the machines increases progressively along the line, from 247 cans a minute in the filler to 250 in the weigher, 252 in the clincher, and 255 in the vacuum. Thus, if belt slippage should occur, higher capacities of the later machines usually are sufficient to prevent jams. Two lines are operated independently, each with a 25 h.p. main-drive motor.

Handling Cans after Sterilisation

From the vacuum, the cans go through another sprayer to the cooler, which is a widening chute whose end is above a cooler, or tray. The cans are allowed to accumulate on the loader until they will fill a tray, holding 168 cans, when the flow is stopped with a slicing-off stick, the chute lowered, and the entire collection swept into the tray. An empty tray is pushed up from behind for the next collection.

Three forged hooks on a Y-shaped rod are attached to the loaded tray and a $\frac{1}{4}$ ton electric hoist lifts it on to a steel pallet board on a roller conveyor extending a few feet out of the building.

The trays are piled up until they number six (the conveyor is long enough for three such stacks) when they are taken by lift truck to the four retorts in a nearby building. Cooking temperature of 242°F. at 14 lb. pressure is attained in 20 minutes and automatically maintained for $1\frac{1}{2}$ hours, after which another 20 minutes is allowed to reduce the temperature. The cans are air or water cooled to 100°F. before casing, usually the next afternoon.

The PAF steam plant, with semi-automatic boiler holding a pressure of 125 lb., has several novel features. Rather than build a chimney up to 100 ft. high for gravity draught, company engineers built a forced draught system which requires a chimney only 50 ft. high. The stack cover is controlled from the floor of the boiler room.

Corrosion in the Food Industry

In a treatise* (in German) concerned with the quantitative assessment of the effect of metal particles in food caused by contact with corroded parts of the processing machinery, the author has attempted to clarify the influence of these particles on food and hence on the human body.

In the first part of the book, the author outlines the present state of knowledge of this aspect of food production and goes on to describe, in the second section, a series of tests carried out to ascertain the effects on various foodstuffs caused by the use of corroded machinery and in particular in the processing of flour and bakery products.

One series of tests was carried out, under strictly controlled conditions, with a specially designed kneading machine to which arms made of different metal and non-metallic substances were fitted and weighed before and after 1,170 hours of operation, in order to determine the quantity of material transferred into the dough. Other tests comprised the precision weighing of machine parts (*e.g.* dough pumps of known original weight) which had been in operation for a known number of hours over a number of years. The daily losses in weight thus determined were found to be of the order of 3 mg. The results of these tests were more or less confirmed by the analysis of the dough samples used. Similar tests were carried out with other products.

Containing an extensive international bibliography on corrosion phenomena, the book provides a useful contribution to the subject.

* *Die Beinflussung von Nahrungsmitteln durch Korrosion an den Verarbeitungs-Machinen.* ("The Effect on Foodstuffs of Corrosion of the Processing Machinery.") By Hans Bahlsen. Pp. 53. R. Oldenbourg Verlag. Price DM. 8.80 Lw.

Experimental belt harvester on m.v. Chondrus. *Courtesy Institute of Seaweed Research.*

Seaweed Harvesting and Processing Research

Work on the development of continuous harvesting machinery and on the extraction of alginates from seaweeds, started by the Institute of Seaweed Research early in 1953, is described in the Institute's annual report for 1953. Further investigations have been carried out on the removal of water from seaweed, mainly by non-thermal means, and bulk samples of algal chemicals have been produced for extra-mural investigators.

THE development of harvesting methods for brown sub-littoral seaweed has been the main concern of the Mechanical Engineering Department during the year under review. A large experimental continuous grapnel or belt harvester has been operated at sea for over 100 hours, the first time that this has been possible with sublittoral seaweed of the type common to Scotland as well as to Norway, France, Nova Scotia, and Japan. Investigations of the problems associated with harvesting are also being carried out on a model scale in a laboratory tank. This technique is being applied to the solution of the outstanding problems in the cutting and entrainment or suction method.

Production of Algal Chemicals

A two-stage counterflow batch process for the extraction of water-insoluble laminarin, based on the laboratory process by Black *et al.* (*J. Appl. Chem.*, 1951, **1**, 505), has been developed to a semi-technical scale. The size of starting material used in the small scale laboratory work (milled to pass $\frac{1}{64}$ in. mesh) was, on the larger scale, too fine for subsequent separation in a reasonable time. It was shown that material milled to pass an $\frac{1}{8}$ in. screen gave a higher degree of extraction with less filtration difficulty than when using finer or coarser materials, and this size was consequently adopted in the larger scale investigations. Partly to compensate for the increased size, and partly to prevent premature precipitation of laminarin before the second stage extraction and clarification stages were complete, the reaction temperature was increased from that employed on the small scale (room temperature) to 40° to 60°C. A dilute acid-weed ratio of 4 or 5: 1 was found to be the lowest practicable ratio consistent with reasonable efficiency.

The results of this work have been used in formulating a possible commercial scale process and calculating the approximate cost of production.

Continuous Extraction Unit

Because of the advantages of continuous counter-current extraction, work is proceeding on the development of an extraction unit for this purpose. The experimental set-up, constructed in glass, consists essentially of a column down which the dried, milled weed gravitates against an upward stream of extracting fluid, the spent weed being discharged at the foot of the column and the extract near the top. The weed, fed by means of a small screw conveyor, is kept in suspension in the extracting liquor by a series of paddles and discs, and is drawn off at the base by a specially designed positive displacement pump.

Work on this unit to date has been confined to improving its mechanical operation, and several problems still require solution.

Alginic Acid

Satisfactory extractions of alginic acid have been obtained by treating dried, milled weed with about three times the theoretical quantity of sodium carbonate at a temperature of 50°C. for a period of two hours, followed by dilution and filtration. The yield of alginate, about 85 per cent. of the theoretical, was proportional to the quantity of liquor filtered from the weed residue. This difficult filtration problem is being investigated in collaboration with various sections of the chemical plant industry.

Other work in this field has been devoted to the production of L-fucose and hydroxyethyl laminarin and to a study of liquid-solid extraction for which a diffusion apparatus has been designed and is being tested initially with porous earthenware slabs which are being used as artificial carried solids.

Thermal Drying of Seaweed

A commercial scale through circulation belt type drier has been tested and its thermal efficiency calculated during a production run on littoral seaweed (80 per cent. *Ascophyllum nodosum*, 10 per cent. *Fucus vesiculosus*, and 10 per cent. *F. serratus*). The evaporation rate, based on an observed production of 13 tons of about 14 per cent. moisture content, using a material of about 69 per cent. initial moisture content, was 4,050 B.Th.U./lb. water evaporated. This poor performance may be due to the employment of through-circulation drying with relatively shallow beds, giving a very small time of contact.

De-watering by Pressure and Plasmolysis

Several different types of conventional screw expeller were used to assess the possibility of expelling fluid from *Laminaria cloustoni* whole plants chopped into about 6 in. lengths, *L. cloustoni* stipe only and *L. cloustoni* frond only. The results indicated that stipe and frond together can be pressed to give about 50 per cent. weed and 50 per cent. fluid, but that all the fluid comes from the stipe. At the same time, in the machines tested, stipe alone caused choking from which it appears that the frond acts as a lubricant.

It should be appreciated, however, that the machines used were each designed for a specific material other than seaweed, and there is little doubt that modifications to the design would make them suitable for stipe alone from which significant quantities of fluid could be expressed. It does not appear that frond can be treated in this way with any hope of success.

Further experiments have been carried out on the removal of water from Laminaria fronds by plasmolysis. In the original experiments, treatment with 35 per cent. sodium chloride for 10 minutes removed about a third of the water originally present but doubled the ash content. Subsequent experiments, using a 10 minute 35 per cent. calcium chloride treatment, removed about half the water and increased the ash content by less than half.

A 10 minute water wash after the sodium chloride treatment put back all the water and gave a product with an ash content slightly lower than the original. A similar wash after calcium chloride treatment put back only one-third of the water removed and gave a final ash content only half that of the original material.

Algal Chemistry

Work has continued, on a laboratory scale, on methods for the isolation of mannitol and the effect of solvents on the grade of alginic acid. Several derivatives, with promising results in the medical field, have been prepared from laminarin, while attempts have been made to prepare derivatives from fucoidin. Analytical methods have been worked out for the determination of galactose and other sugars in samples of algae and terrestrial plant material, and for the estimation of laminarin sulphate in blood and urine samples. Fundamental studies have continued on the chemical composition of laminarin, while work has been initiated, and some progress made, on the enzyme systems present in the algae. A preliminary study has also been made of the carbohydrates present in some of the green algae.

Algal Proteins

Mr. R. F. Jones, under the direction of Dr. B. L. Moss of the Botany Department, King's College, Newcastle, has continued his study of the variations of the nitrogenous constituents during the development of the brown alga, *Himanthalia elongata*. The analytical methods for the determination of the different nitrogen fractions have been examined and applied to samples of this alga. The free amino acids have been studied, and the amino acids present in hydrolysates have been subjected to partition chromatography and 15 amino acids detected.

At the Institute, Dr. C. B. Coulson has completed his investigation of the amino acids and isolated proteins of the marine algae. Various methods have been tried for the extraction of the proteins from fresh and dried milled weed. With the brown algae, protein precipitation at *p*H 4-5 was complicated by the fact that alginic acid was also precipitated at this *p*H, and consequently the purest protein obtained from *Laminaria cloustoni* frond contained only 9 per cent. nitrogen, but relatively pure protein has been isolated from the red and green algae. The amino acid pictures of the isolated proteins were found to be very similar to those of land plants.

A large scale extraction of fresh *Rhodymenia palmata* was carried out and the proteins fractionally precipitated. Two red and one green fraction were obtained, the two reds being very similar, with absorption curves corresponding to phycoerythrin. The approximate amino acid composition of the bulk proteins of *R. palmata*, *Enteromorpha intestinalis* and the protein concentrates from *L. cloustoni* frond and *Ascophyllum nodosum* has been determined by Block's method, depending on direct estimation on two dimensional chromatograms and involving the measurement of colour density and area of the ninhydrin developed spots.

Abstracts From Recent Food Literature

Chronic Toxicity of Bread Additives to Rats. W. D. Graham, H. Teed, and H. C. Grice (*J. of Pharmacy and Pharmacology*, 1954, **6**, 534).—Experiments are described by which the toxicity of the additives to bread was checked in combination rather than singly since the toxicity of the finished bread was of major concern. It was also decided to incorporate the additives under test in bread at 50 times the normal concentration and to give the finished bread as 75 per cent. of the experimental diet. It was found that bread containing 50 times the normal concentration of chlorine dioxide, propyl gallate and butylated hydroxyanisole, polyoxyethylene (8) monostearate, or sodium propionate as 75 per cent. of the diet for one year did not harmfully affect growth or mortality of rats. The high concentrations of polyoxyethylene (8) monostearate sodium propionate, antioxidants, and chlorine dioxide had no detectable effect on organ weights or on histopathology of the tissues. No evidence was obtained that the simultaneous presence of high concentrations of more than one potential toxicant in the diet led to any synergistic action.

Concentration of Strawberry Juice. L. H. Walker, G. H. Notter, R. M. McReady, and D. C. Patterson (*Food Tech.*, 1954, **8**, 350).—Methods are presented for the preparation of concentrated strawberry juice and for the recovery of volatile flavour constituents. Causes of gelation in juice, clarification by use of pectic enzymes, effect of varying percentages of evaporation during essence recovery, and of temperatures during concentration were determined.

New Strawberry Freezing Plant processes 1,000 Boxes per Hour (*The Canner*, 1954, **119**, Aug. 23, 12).—Description of a new strawberry freezing plant designed to handle 16 million pounds per year.

Heat Treatment of Milk within the Bottle. E. L. Crossley (*The Royal San. Inst. J.*, 1954, **74**, 307).—Discusses the development of in-bottle pasteurisation, advantages and disadvantages of the process, and the legal definition.

Tubed Sugar Service (*Mod. Packag.* 1954, **27**, 102).—A ½ oz. single serving of loose sugar is packaged in a tube of 300 MST 56 cellulose film about the length of a teaspoon. The slender shape limited machine filling speeds, so that it was necessary to develop a machine that would produce four packs at a time or 300 per minute.

New Developments in Cheesemaking. O. R. Irvine (*Can. Dairy Ice Cream J.*, 1954, **33**, 40).—The paper includes information on the new short-time systems of cheesemaking.

The Manufacture of Cheese Spreads. R. von der Heide (*Nord. Mejeritidsskr.*, 1954, **20**, 90).—Various points concerning the manufacture of these products and the chief faults to which they are subject are discussed.

Blending Wheat. P. Halton (*The Arkady Rev.*, 1954, **31**, 41).—The author discusses the importance of blending wheats to obtain flour of a satisfactory quality and the necessity for taking into account the various factors which determine baking quality.

The Viscosity of Liquids. E. N. da C. Andrade (*Endeavour*, 1954, **13**, 117).—The viscous properties of liquids offer peculiar difficulties to the theoretical physicist who wishes to deduce them from the conventional laws of molecular interaction. Examination of the experimental results has, however, revealed a number of general regularities, especially where the variation of viscosity with temperature is concerned, and, in the case of the less complex liquids, some approach has been made to an explanation along simple lines.

Resistance of Bacterial Spores to Gamma Irradiation. B. H. Morgan and J. M. Reed (*Food Res.*, 1954, **19**, 357).—The results are given of an investigation centred on the determination of the relative gamma irradiation resistance of the spores of *Cl. botulinum* in relation to other food spoilage organisms and on a study of the environmental factors which might influence the sterilisation requirements of these spores. Under arbitrarily standardised conditions, spores of *Cl. botulinum* were more resistant to gamma radiation than spores of the other food spoilage organisms investigated. However, it was shown that different conditions during spore production or irradiation could increase or decrease the sterilisation requirement for a particular type of organism.

Instantaneous Decantation, Purification, and Softening of Water. R. Mouchet (*Revue Technique de l'Industrie Alimentaire*, 1954, **2**, July, 25).—Detailed description of a water treatment plant installed at the canning works of the *Conserveries de France* in Brittany. This plant comprises a decanting installation of a new type, a sterilisation plant, filters, and water softeners. Research is still proceeding on the design of another plant which will deal with the used water before it is restored to the river.

Flour for Wafer Manufacture (*Gordian*, 1954, **54**, No. 1289, 21).—Difficulties met with in the production of wafers are mostly due to changes in the flour used. Flour mixes found to yield good, "non-sticky" wafers at one factory often give unsatisfactory results at another. Costly and unreliable empirical trials can, however, be superseded by the methodical use of farinographs or extensographs indicating the stability or elasticity of the dough.

Keeping Tests on Milk subjected to High Temperature-Short Time Pasteurisation. H. Sudholt and H. Dirking (*Deutsche Molkereizeitung*, 1954, **75**, 1153).—At the request of the dairy associations of the German region of Nordrhein-Westphalia, keeping tests have been carried out on quality-selected H.T.-S.T. treated milk of different temperatures, with and without partial homogenisation. After the treatment, all the samples were kept at 7°C. for 24 hours, and then at 18°C. for an observation period of up to 78 hours during which the milk samples were systematically tested for *p*H, bacteria, etc. Best results were obtained with H.T.-S.T. milk stored at 7·5°C. when keeping times of over 60 hours were found. Among the conclusions to be drawn from these tests are the indispensability of modern

pasteurisation methods, the need for a strict avoidance of contact and air infections, and for adequate cooling.

The Effect of Alkaline and Acidic Ingredients on the Manufacture of Rusks. H. Dörner and E. Tehsmer (*Gordian*, 1954, **54**, No. 1290, 13).—The authors have investigated the effect of certain ingredients on the quality of the rusks (porosity, etc.). It was found that the quality could be influenced by the kneading process. The fat constituent should preferably be cream which ensures a finer distribution of the fat. Admixtures of soda and potassium should not exceed 0·2 per cent. because a greater percentage admixture has an unfavourable influence on the appearance and, sometimes, on the taste of the rusks. Best results are obtained if soda and potassium are dissolved and emulsified together with the fat. An admixture of adipic acid was found to improve the porosity and appearance.

Palm Oils and their Carotene Contents. A. Bienaymé (*Oléagineux*, 1954, **9**, 603).—Preliminary results of a major research programme carried out at the *Institut de Recherches pour les Huiles et Oléagineux* during the last five years, on the carotene contents of palm oils and palm fibre oils from different French territories. The carotene contents vary considerably but are, on the whole, so great that a systematic extraction of carotene from certain palm fibre oils promises to yield, at an economic price, a highly valuable by-product of good quality which can be used as provitamin A and for combinations of vitamins A and D.

Contribution to the Study of Crown Rot in the Oil Palm. A. Bachy (*Oléagineux*, 1954, **9**, 619).—So-called "crown-rot" or "bud rot" is an often encountered but little explored disease of the oil palm. To widen the knowledge of the disease and of possible remedies, the Middle Congo Station of the French *Institut de Recherches pour les Huiles et Oléagineux* has carried out systematic research on the subject. It seems that the cause of the disease must be seen in a disequilibrium of hormones affecting the plant growth. Remedies might be found in planting resistant material or resorting to selective cultivation. Further research work, now in hand, is expected to reveal the influence of climatic and other relevant factors.

TO AUTHORS AND READERS

The publishers of FOOD MANUFACTURE invite the submission of manuscripts of books to be considered for publication. All manuscripts will be promptly acknowledged and carefully considered by qualified experts. A synopsis with chapter headings should be sent in the first instance, addressed to the Book Production Manager, 9 Eden St., London, N. W. 1.

The publishers have a world-wide selling and distributing organisation.

Disinfection in Slaughterhouses and Meat Processing Plants. F. Kelch (*Die Fleischwirtschaft*, 1954, **6**, 349).—Extract from a thesis based on bacteriological research work in food producing plants of various kinds. Tests of disinfectants under normal working conditions showed that a cold 0·1 per cent. crude chloramine solution is particularly effective, especially where, as in slaughterhouses, the spreading of salmonella bacteria must be feared. The use of 0·1 per cent. cold, freshly prepared hypochlorite solutions is recommended for the weekly disinfection of plant and equipment. This applies to slaughterhouses as well as meat processing plants, and especially to those departments where meat is finely chopped or ground. Daily disinfections should be carried out with 1 per cent. *Tego* solutions heated to 60°C., but every operation must be preceded by the application of 3 per cent. hot soda solution.

Importance of Common Salt for the Manufacture of Dry Sausages and Frankfurter Sausages. F. P. Niinivaara (*Die Fleischwirtschaft*, 1954, **6**, 357).—The Finnish Research Institute of Co-operative Slaughterhouses has carried out research on the effect of common salt on the quality of sausage meat. According to the *p*H range, the water binding capacity of the meat may be either increased or reduced. Although, in the normal *p*H range of sausage meat, the addition of salt increases the water binding capacity, the water evaporation during the processing is not slowed down because the *p*H value of the meat decreases simultaneously to a value where the salt admixture has the opposite effect. This does not apply to sausages of the Frankfurter type where the *p*H value does not drop during the processing.

In this case, however, an improved water binding capacity is desired.

Fruit Juice by the Yard (*S. Afri. Packag.*, 1954 **2**, 47).—Describes an experiment in packing tomato and orange juices in Pentathene plastic carried out by Penta Chemical Industries of Durban. The juice is strip packaged in unit portions and the method might be adopted profitably for export packaging instead of canning.

Marking Biscuit Containers (*Biscuit Mkr. and Plant Bkr.*, 1954, **5**, 320).—A description is given of a high speed power driven automatic machine which, with special feeding and conveyor arrangements, is capable of printing on upwards of 5,000 articles per hour, whether they are tin, cardboard, packaging materials, lead foil, paper wrappings, plastics, glass, porcelain, or wood. The method is equally efficient on any shape.

Printing is taken off a resilient rubber pad.

Cold Storage of Meat in Slaughterhouses. G. Kouwenhofen (*De Slagerij*, 1954, **39**, 644).—The general availability of cooling facilities at retail shops and the intervention of wholesale butchers have brought about considerable changes in the cold storage requirements at slaughterhouses. These changes have had repercussions on the type, size, and layout of cold storage facilities at wholesale slaughterhouses, there now being a greater emphasis on pre-cooling installations.

Among the cases in point are the new, wholly automatic pre-cooling installation at Rotterdam abattoir, and the reconstruction of the cold storage facilities at Eindhoven abattoir where the pre-cooling premises have been enlarged at the expense of the cold storage premises proper.

News from the Industry

FORTHCOMING EVENTS

The Nutrition Society

The Nutrition Society is holding a symposium at The Middlesex Hospital Medical School, London, W.1, on Saturday, November 20, 1954, on "The National Food Survey of Great Britain."

The chairman will be Dr. N. C. Wright and the following contributions have been arranged:

Mr. A. H. J. Baines and Miss D. F. Hollingsworth (London): "The diets of elderly women living alone."

Mr. C. J. Brown and Mr. S. Clayton (London): "The pattern of the national diet after fourteen years of rationing."

Mr. J. A. C. Brown (Cambridge): "Economics, nutrition, and family food budgets."

Mrs. E. H. Gibson, Mr. W. L. Readman, and Miss G. M. Warnock (London): "Food and family size."

Dr. I. Leitch, O.B.E. (Bucksburn): "Review and comparison with the pre-War Carnegie Survey."

Mr. W. L. Readman (London): "Technique and methods of the National Food Survey."

Further particulars may be obtained from the Programmes Secretary of the Nutrition Society, Dr. R. J. L. Allen, c/o Monkhouse and Glasscock Ltd., Snowsfields, London, S.E.1.

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The Institute of Packaging

Among the November meetings arranged by the Institute of Packaging are the following:

Nov. 4. 6.30 p.m. Joint debate with the Institute of Materials Handling, to be held at the Waldorf Hotel, London.

Nov. 12. 6.30 p.m. "Package Testing," by Mr. D. Watkinson, at the Grand Hotel, Bristol.

Nov. 15. 7.30 p.m. "Packaging Film," by Mr. C. V. Stanner, at the Empire Hotel, Leicester.

Nov. 17. 6.30 p.m. "Design in Service Packaging," by Mr. P. A. Andrew, at Peel Restaurant, Boar Lane, Leeds.

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The Society of Chemical Industry

Three meetings will be held by the Food Group during November as follows:

Nov. 1. Joint meeting with the London Section and the Microbiology Group. "Newer Aspects in Cider Research," and "Problems Involved in the Isolation and Classification of Cider Micro-organisms," by Dr. A. Pollard, Mr. F. W. Beech, and Mr. J. G. Carr.

Nov. 10. Conversazione. Joint meeting with the Agriculture Group at Greenford.

Nov. 24. Food Group domestic meeting. "Some Aspects of Soya as a Bread Improver," by Mr. E. Mitchell Learmouth, and "The Problem of Artificial Cream," by Dr. Betty C. Hobbs.

The November meeting of the Agriculture Group will be held jointly with the Microbiology Group on November 11 at the Medical Society of London when papers will be read by Dr. A. T. Phillipson and Dr. A. E. Oxford on "Digestion in the Ruminant."

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The Chemical Society

Included in the programme of meetings for November arranged by the Chemical Society are the following:

Nov. 5. "Some Mould Colouring Matters," by Prof. A. Robertson at 8.30 p.m. in the Chemical Laboratory of Cambridge University.

Nov. 10. "Food Legislation during the War," by Sir Harry Jephcott at 6 p.m. at Robert Gordon's Technical College, Aberdeen.

Nov. 18. "The Regulation of Plant Growth with Chemicals," by Prof. R. L. Wain at 7.30 p.m. in the Chemistry Lecture Theatre, Sheffield University.

Nov. 29. "Some Aspects of the Chemistry of the Amino-sugars," by Prof. M. Stacey at 5.15 p.m. Joint meeting with the Durham Colleges Chemical Society to be held in the Science Laboratories, The University, Durham.

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Midlands Electronics Exhibition

An exhibition of electronic aids to production, design, and research, under the title "Electronics at Work," organised by the Scientific Instrument Manufacturers' Association, is to be held in Birmingham from November 23 to 25, at the Chamber of Commerce Hall. Admission is by ticket obtainable free from the Association at 20, Queen Anne Street, London, W.1.

There will be a large number of working demonstrations showing the employment of electronics in a wide range of industrial applications, in public services, medicine, and education, and in varied spheres of research and development.

Pea Crop Worst for 35 Years

In opening the recent Benedict and Country Market sales conference, Mr. R. C. Scott outlined the present position in regard to the dried peas harvest, which has been one of the worst for 35 years. He pointed out that it was neither to the advantage of the company nor of the country as a whole that farmers should be encouraged to grow peas and then have them left on their hands because foreign peas were cheaper. Such a policy could only result in our becoming more and more dependent on foreign supplies, a position that suppliers from abroad would be only too quick to take advantage of were it allowed to develop.

Food Manufacturers' Golf Meeting

Mr. W. Leonard Hill, chairman of Leonard Hill Limited, was among those present at the Annual Golf Meeting of the Food Manufacturers' Federation. Of the meeting at Wentworth, he writes:

"Bidden there by the President, and prompted by an old friend, Col. George Harding, we had the pleasure of going round with Mr. J. B. Bird, of Geo. Payne and Co., Ltd. We feel sure that we are both much better at our professions than at golf!

"Considering the weight of responsibility that lies on food manufacturers, it was good to see them so obviously enjoying the delights of the Wentworth Course on the pleasant, rather warm, but otherwise true golfing day.

"The big cup was carried off by Mr. F. E. Corbin, whom we had not before had the pleasure of meeting. A moderately but sturdily built man, with a mane of white hair, he is associated with the West Somerset Bacon Co., Ltd.

"In the afternoon, Mr. W. J. McKinnon Matthews of the company bearing that name had the misfortune to carry us as his partner but, quoting Pepys, 'All very merry.'"

Edible Oils and Fats

Specialising in the import of edible oils and fats, Fatoils Ltd. are at present mainly dealing in English and Commonwealth refined vegetable oils (groundnut, coconut, palm, palm kernel, cottonseed, and safflower oil), peanut butter, the whole range of refined hardened deodorised vegetable and fish marine oils, and animal fats, *e.g.* edible tallow, dripping, oleo stearine, oleo stock, lard, and edible pork fat.

As sole agents of Continental lecithin manufacturers, the company are importing edible soya lecithin for use in sugar and flour confectionery and margarine production.

Other commodities are their *Indal* brand locust bean gum powder (carob gum), a thickener for sauces, an emulsifying agent for ice cream, and an ingredient in confectionery products, sausages, etc., and pure glycerin, agar-agar, and beeswax.

Cold Storage Decontrol

Government control of cold storage will end on December 24. After that the Government cold stores built during the war will be operated jointly by the Government and the cold storage industry through the medium of a managing company, thus ensuring that they will not be used in unfair competition with the industry.

Sandwich Packs

A new method of sandwich wrapping has been introduced by Marks and Spencer. To combine easy access to the contents with all the protective advantages of a strongly heat-sealed wrap of moistureproof type *Cellophane* cellulose film, use is made of tear-tape wrappers which are applied in the normal way to give a triangular wrap. These wrappers are rectangular in shape and have a tear-tape already incorporated. The end of the tape protrudes slightly on the finished pack and a quick pull neatly halves the film wrap when the contents are required.

Materials and Machines for the Food Industry

Developments in the food processing field and in the design of new equipment were evident at the recent Scottish Industries Exhibition. New ranges of essences for the food, soft drinks, pharmaceutical, and allied industries were displayed, together with skinless sausages and a meat tenderiser. Hitherto, the problem has been to produce, stabilise, and pack this latter product in liquid form, but this has now been overcome, with satisfactory results.

In the equipment field may be mentioned a new vertical mixer with applications in the food, chemicals, pharmaceutical, cosmetic, and plastic industries. The planetary head, with mixing equipment, is mounted on slides which allow it to be raised or lowered by an independent geared electric motor. The bowl raising and lowering mechanism is power operated and controlled by push button. A feature of the new machine is the variable speed gear which allows a range of speeds greater than those required for mixing operations and is controlled by a handwheel control. Units are available for handling 80, 100, and 200 Imperial quarts.

For the brewing industry, two items of equipment were of particular interest. The first concerned the production of equipment for the bulk handling of liquids direct from the tanker into the cellar and the second a new type of container which dispenses completely with the conventional broacher and extractor.

New "Luxury" Margarine

A new margarine is to be introduced to the public by Van den Berghs on November 1. Called *Summer County*, it is the first margarine to be developed since the days of unrationed plenty.

Mr. Julian Best, managing director of Van den Berghs, states: "There is evidence of a big demand for a luxury margarine. Our job is to meet this demand and supply the housewife with what she wants—so we are introducing *Summer County*. A product of this sort calls for special high-quality ingredients which are costly and hard to find; *Summer County* will therefore sell at a higher price and initially may be in short supply."

The new margarine will be delivered to the retailer in small display cartons of 1 doz. ¼ lb. packets, each packet wrapped in a new style laminated foil. It will retail at 2s. 4d. per lb.

London Office Opened

Padley and Venables Limited of Birmingham have opened a new London office at 66, Victoria Street, London, S.W.1. The opening was marked by a reception on September 28 and among those present were Mr. A. Bennett, a director of the company, and Mr. E. A. Martin, the London manager. On show at the reception was a representative range of stainless steel products of the company.

Cadbury Prizes

Annually, Cadbury Bros. donate £10 each to different schools of technology throughout the country for the best part-time and full-time students in baking and flour confectionery. This year's prizes were presented at Bournville by Mr. Paul Cadbury on October 1.

Soya Products for the Food Industry

At their soya oil extraction plant in Cardiff, Soya Foods Ltd. produce crude degummed soya bean oil of good commercial quality, crude lecithin, extracted soya bean meal, *Soyolk* (a full fat soya flour), and defatted soya flour. The oil, lecithin, and meal are sold on an *ex* mill/FOR/FOB basis, while the flours are sold delivered to any destination in the British Isles.

Oil is sold in bulk only and is not available in drums or casks, but the company's plant is equipped to deliver to road or rail tanker, or can load overside to craft up to approximately 1,000 tons capacity. Lecithin is packed in 400-500 lb. drums, *Soyolk* in 1 cwt. hessian bags and 56 lb. multi-ply sacks, and defatted soya flour in 56 lb. multi-ply paper sacks.

The company have their own research laboratory and test bakery in Cardiff at which manufacturers' enquiries are welcomed.

BOOKLETS RECEIVED

A completely revised edition of the Saunders technical handbook has now been published and contains useful information and tabular matter concerning the company's valves and pumps.

*

The full range of the company's stainless steel pumps for the dairy, brewing, and beverage factory is described in a recent APV publication. It also contains useful information concerning the best methods of ordering pumps, *e.g.* capacity, pressure, liquid to be pumped, size of the pumping lines to be used, temperature at which the liquid is being pumped, solids content of liquid, and electric supply.

*

Two new Fisholow products are described in a recent manual published by Fisher and Ludlow. One of these — Flowforge flooring — an electrically forge-welded flooring of exceptional strength to weight ratio is produced in panels 20 ft. span × 3 ft. wide to minimise erection costs. Another new product is the unit construction platform which provides storage platforms or working floors by dividing the available height and thereby doubling the effective floor space.

OBITUARY

Mr. George Cadbury at the age of 76 at his home in Birmingham on September 27.

Born in 1878, George Cadbury was the second son of the late George Cadbury (one of the second generation of partners in the business and founders of the Bournville factory and housing estate).

In 1899, he became a managing director of Cadbury Bros., and in 1932 he became chairman of the British Cocoa and Chocolate Co., Ltd. (the holding company controlling Cadbury's and Fry's), and in 1936, vice-chairman of Cadbury Bros., Ltd. He retired in 1943.

Mr. Cadbury was a man of wide interests and will be remembered for his activities in many different spheres. His contribution to the Bournville business lay chiefly on the production and transport sides, and also in the education of the young employees and in joint consultation between employer and employee.

His scientific training in England and Germany was applied to the problems of rationalising manufacturing processes, and it was his experimental work that led to the introduction in England of milk chocolate—hitherto a Swiss monopoly.

He was closely associated with the foundation of Fircroft College for working men and its later offshoot, Avoncroft, for agricultural workers. Housing, town planning, and inland waterways were among other activities in which he played a leading part. His interest in England's canals was well known, and he was a member of the National Council of Inland Waterways and chairman of the Severn Carrying Co., Ltd.

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Mr. Benjamin Seebohm Rowntree, C.H., chairman of Rowntree and Co., Ltd. from 1925 to 1941, on October 7 at the age of 83.

The second son of the late Joseph Rowntree, founder of the cocoa and chocolate firm at York, he was born on July 7, 1871, and was educated at the Quaker School at York and at Owen's College, Manchester.

The rapid growth of the York concern, of which he was vice-chairman before he succeeded his father as chairman in 1925, was largely due to his efforts. Under his chairmanship, much was achieved in improving the workers' position, one of his great interests being the Joseph Rowntree Village Trust and the creation of a garden village at New Earswick for housing employees and others.

His name will always be associated with his efforts to improve social conditions. His first book "Poverty: A Study in Town Life," a survey of social conditions in York, was published in 1901. He promoted a second and wider survey of York in 1936, the findings of which were published in "Poverty and Progress" in 1941. The results of further surveys were published in 1950 and 1951.

He participated in the work of many committees concerned with housing, unemployment, and British agriculture; he was also a trustee of the King George's Fields Foundation, of the Nuffield Trust for Distressed Areas, President of the Outward Bound Trust, and chairman of the old age survey committee set up by the Nuffield Foundation. Mr. Rowntree was an active member of the Committee of the National Institute of Industrial Psychology and of the Industrial Welfare Society, being the originator of the Lecture Conferences for Works Directors, Managers, and Foremen and of the Management Research Groups.

Although he made his home in Buckinghamshire following his resignation of the chairmanship of the company in 1941, he retained his close interest in York matters.

Mr. Rowntree was a justice of the peace and an honorary LL.D. of Manchester University. He was made a Companion of Honour in 1931.

■

Mr. A. Van Rooyen, managing director of Blok, Van Rooyen and Co., Pty., Ltd., at the age of 46.

The company is the Australian representative of Polak and Schwarz Ltd., and the deceased had been connected with the essence, perfume, and essential oils trade in Australia and New Zealand since his arrival in New Zealand in 1926.

This company and their associate, Beaver-Ross Ltd., will continue to operate under the management of the chairman of directors, Mr. Leo Blok.

ERECTIONS AND EXTENSIONS

Plans made by the **Midland Rusk Co.** to carry out extensions to their factory in Cauldwell Road, Nuneaton, Warwickshire, have now been approved.

■

A new extension to their factory in Wayland Road, Sutton Coldfield, Warwickshire, is to be built by **Schweppes, Ltd.**

■

Construction of a new £2,500,000 factory is to be carried out for **H. J. Heinz and Co., Ltd.,** on a site between Walthew House Lane and the River Douglas at Kitt Green, Wigan, Lancs.

■

Coca-Cola Southern Bottlers, Ltd., Southfield Road, London, W.4, are having a new factory erected on the Brislington Trading Estate, Bristol.

■

Batchelors Peas, Ltd., of Wadsley Bridge, Sheffield, are planning to construct a new £1 million factory on a site at Sheffield.

APPOINTMENTS AND RETIREMENTS

Mr. Leslie Hopkins has been appointed general sales manager of the St. Martin Preserving Co.

■

Mr. T. J. Hartnett, formerly of the British Aluminium Co., has been appointed technical sales representative for the London and South Eastern areas of Warwick Production Co., Ltd., a member of the Associated Light Metal Industries Group.

■

Beecham Group Ltd. announce that Mr. R. Craig Wood has been appointed a director of the company. He will join the executive directors at headquarters and will be principally concerned with development projects. Mr. Craig Wood was formerly managing director of Thomas Hedley and Co.

■

Mr. John Morgan Davies, Principal of the Cumberland and Westmorland Farm School, Newton Rigg, has been appointed to the technical staff of the Fatstock Marketing Corporation and will take up his duties on December 1.

For two years before he went to Newton Rigg in January, 1947, Mr. Davies was Welsh Secretary of the National Farmers' Union.

■

Mr. J. W. Urban, director of overseas relations, has been appointed a director of Monsanto Chemicals Ltd.

Mr. Urban, who first joined the company in 1929, has had 35 years' experience in the chemical industry. He will continue his duties as director of overseas relations.

At the same meeting, the resignation of Dr. W. D. Scott from the board was accepted with regret.

Wine Tasting at Westcliff

An opportunity to taste French wines and spirits was given by La Montagne (London) Ltd. at a reception at the Holmwood Hotel, Westcliff, on October 18, as part of the programme of events during the French Trade Fortnight.

Included in the Wine and Spirit Programme were: Champagne Brut, E. Roemer; Graves Sec; Chablis; Château de Tours, St. Etienne la Varenne, Rosé de Beaujolais; Gevrey Chambertin; Châteauneuf du Pâpe; Armagnac Très Vieux, Samalens—La Montagne; and Rhum St. James.

Correction

In the article "The Higher Alkyl Gallates" published in the October, 1954, issue of FOOD MANUFACTURE, the captions to Figs. 2 and 3 (pp. 403 and 404) have been transposed.

Chemicals from Fatty Acids—Armour's New Venture

Armour and Co., Ltd. of London will sell next year from British production the range of chemicals now made solely by Armour and Co., Chicago. A new plant for producing these chemicals is being built at Littleborough, near Rochdale, Lancashire, by Hess Products Ltd., at a total cost of approximately £250,000.

Armour and Co. have developed this trend towards greater emphasis on chemical manufacture over the last 20 years to broaden the basis of their original meat packing business.

Nearly all the new plant will be of British manufacture and will be erected and operated by British labour. It will be adjacent to the existing Hess Products' fractional distillation unit, which has been producing *Distec* fatty acids since 1950. Fatty acids will be pumped across to the catalyst plant now under construction, where they will be contacted with ammonia. Operation will be continuous and completely automatic, yielding high grade aliphatic nitriles.

As the nitrile issues from the plant in continuous flow it is passed to the hydrogenation section where it is turned into the primary amine. Depending on the type of fatty acid used, a whole range of these amines (*Armeens*) can be produced.

By a modification of this process, other amines can be produced, including the diamines of the general formula $RNHC_3H_6NH_2$ (*Duomeens*). By reacting any of the amines with an organic acid, water-soluble salts are obtained which have high surface activity. Among the new chemicals will therefore be the *Armacs* and *Duomacs*, the water-soluble salts of the amines and diamines.

The amines are also used as starting materials for a wide variety of organic chemicals. They are, for instance, quaternarised to give a useful range of bactericidal and substantive products (*Arquads*). They are the basis for certain ampholytic chemicals, alkyl morpholines, and many others, including ethylene oxide compounds (*Ethomeens*).

Paper Manufacture on the Screen

The première of a film of the Reed Group's activities at Aylesford, "The Mill on the Medway," was shown in London on October 6.

Produced by the Orion Picture Corporation, the film runs for 40 minutes and gives some insight into the papermaking process at Aylesford Paper Mills and into the operations of the Medway Corrugated Paper Co., Ltd., and Medway Paper Sacks, Ltd., converting paper into corrugated fibreboard cases and into multi-wall sacks.

WORK TABLES RENOVATED.—At the factory of Harry Vincent Ltd., Hunnington, near Birmingham, which is famous for the manufacture of Blue Bird confectionery, Formica is gradually being introduced throughout the entire premises on all working surfaces. This laminated plastic was chosen because it is so easily cleaned, saving time and labour. We understand that it has been applied to the original old tables and that the renovation is a great improvement on the previous material employed.

The 1954 Dairy Show

The Dairy Show, the great annual "At Home" of the dairy industry, was held at Olympia, London, from October 26 to 29.

Although the Show is sponsored by the British Dairy Farmers' Association, it is by no means exclusively a producers' affair. All facets of the dairy industry from farm to consumer were represented in the exhibits. On alternate years, however, the members of the Dairy Engineers' Association have agreed not to exhibit their plant, equipment, and machinery but to take only office space at Olympia. This year's Show was one when office accommodation only was taken by the engineering firms. This did not mean to say that it was an "off" year, because Olympia was still full of the usual cattle, produce, and dairy and farm appliances, and the engineers had representatives with photographs, plans, etc., of their plant and equipment. In addition, the galleries contained the poultry, pigeon, rabbit, and accessories exhibits.

This year some new exhibits, demonstrations, and competitions were introduced. These included a milk bar where milk, either plain or flavoured, milk shakes, butter, and cream could be purchased.

Another special exhibit was one devoted to the cheeses of Great Britain. Samples of many varieties were on sale to the public and provided an excellent opportunity for the younger people to taste these fine cheeses for the first time and for the older ones to reacquaint themselves with the Leicesters, Wensleydales, Caerphillies, and many others.

Demonstrations were given at intervals throughout the Show on methods of bottling and canning in the home, of scone baking, and of poultry trussing. These were all in addition to the annual events such as the Bledisloe Trophy competition and many others for cattle and dairy produce which drew enormous crowds to see the best in the dairy industry.

Included in the display of dairy accessories and ancillary equipment were a comprehensive range of lighter type motors and control gear suitable for driving dairy equipment, shown by Brook Motors Ltd.

The Gryphon motors, from $\frac{1}{4}$ to 1 h.p. in drip-proof, totally enclosed, or fan cooled types, are supplied with or without feet for flange or resilient mounting. The smaller size fractional, the BS.42 from $\frac{1}{16}$ to $\frac{1}{2}$ h.p. is made for standard, flange, or face mounting. Both types may have ball or sleeve bearings at the same cost.

Motors to British Standard 2083: 1954 in totally enclosed and drip-proof frames are interchangeable for fixing dimensions and centre rise height with similar standardised frame sizes of Brook or other manufacture.

A new rheostatic split phase starter for single phase motors was included in the display, together with modern push button control gear in a selected range of types for single or three phase supply. In conjunction with motors, they ensure immediate starting in all weathers and give protection to equipment and to the user.

Four refrigeration compressors, an air-cooled condensing unit, and two

homogenisers were shown by G. and J. Weir.

The 9 in. × 6 in. × 6 in. ammonia compressor is a compound machine for use where the compression ratio would be excessive for a single-stage type. This machine offers a saving in power because of the lower compression in the individual stages, and its application includes quick freezing plants, ice cream, and other types of hardening tunnels.

The 5 in. × 5 in. ammonia and 5½ in. × 5 in. freon compressors are the latest design of reciprocating machines. The ammonia machine is of a modern light construction not requiring an outboard bearing, thus presenting a very compact space-saving arrangement.

The 7 in. × 7 in. single-acting ammonia compressor and the air-cooled, self-contained condensing unit in which the compressor, condenser, and driving motor are all compactly mounted on the bedplate, the latter using methyl chloride or freon as the refrigerant, were also on show.

The range of homogenisers was represented by the Standard 2A and Junior sizes. The former, which has a capacity of 100 to 200 gallons an hour, is driven by a vertical motor through worm gearing, the motor being mounted directly on the pump framing; it has a single-stage homogenising valve. The Junior homogeniser, which has a capacity of 10 gallons an hour, was representative of the smaller capacity machines; this model is driven by a separate motor through a V belt. The standard range of homogenisers covers all capacities between 10 and 1,250 gallons an hour.

A selection of homogenising valves of the conical, serrated, and insert types, together with a suction and discharge valve assembly for the 2A model, was also exhibited.

A selection of some of the collapsible tubes, capsules, Turnerstyle containers, and foils developed for the food, pharmaceutical, and beverage industries by Betts and Co.

OBITER DICTA

● One trouble with people forced to live under Communism is that they're always thinking about something to eat.—"*The New York Herald Tribune.*"

● Is it the Government's policy now that the standard of hygiene shall be as high as the lowest of the dirtiest firms in the catering industry?—*Mr. A. Robens, M.P.*

● That must be the greatest thing since sliced bread.—*Comment by an American at Farnborough on the crescent-winged Handley Page Victor.*

● The public must be persuaded that the bowl of fruit in the parlour is not there just for decoration but is nice to eat.—*Mr. C. Escott at the annual meeting of the National Federation of Fruit and Potato Trades.*

● The time has come to stop figuring we've got secrets that nobody else knows. The free transmission of information among packers does us all a lot of good.—*Norman Brammall, President of Food Management, Inc., Cincinnati.*

● This country has a rich culinary heritage, but it is fast being driven underground by either the "something fried with chips" regime or the "insipid soup, tasteless meat, and boiled potatoes" school.—*Correspondent to the "Manchester Guardian."*

● Not all our malaise arises from smog, or damp, or infected food. Hates can act as toxins; even love can make us blind, deaf, and witless. We carry ourselves, in that mysterious essence called "Temperament," enough explosive material to blow us up!—"*Health Horizon.*"

● Bwzampulists are collectors of beer bottle labels and their title is derived from BWZ, Gaelic for beer, and AMPULA, Latin for bottle. The label is usually soaked off with water; it can be swilled off with the contents of the bottle, but this method is not recommended.—"*Food Technology in Australia.*"

● The average beer drinker is very conservative and we do not think he would take kindly to buying his beer by the lump. We are keeping abreast of the latest developments, but we do not expect frozen beer to come on the market for at least 10 years.—*A Burton brewery official commenting on the report of the Food Investigation Organisation of the D.S.I.R.*

F.M.C. to Handle New Zealand Meat

An agreement has been concluded with two of the principal co-operative meat producing organisations in New Zealand under which the Fatstock Marketing Corporation is to act as their marketing agents throughout the United Kingdom.

While the agreement will not result in any increase in imports, it does mean that the Corporation have secured a substantial share of the import trade, which plays a vital part in maintaining the orderly marketing of meat.

The first shipments under the agreement are expected this month.

Tubed Food

Many branches of the food packing industry make use of foils in aluminium and pure tin for wrapping cheese, chocolate, and confectionery and collapsible tubes manufactured by Betts and Co. Such products as tomato purée, caviar, butter, cream, and cheese have long been bought in tubes on the Continent, and the company are at present aiming to extend the use in Britain of the collapsible tube in all its forms, including aluminium, pure tin, lead, and various alloys all specially suitable for various food products.

The company have supplied the food, wine, and spirit trades with such products as bottle capsules for over 150 years and information about the latest developments in the production of capsules in tin-coated lead, aluminium, pleated aluminium, and aluminium foil is now available.

The manufacture of rigid aluminium containers, particularly suitable for packing tablets, cigars, and similar types of product, is now progressing rapidly and it is felt that the food industry would do well to consider the many efficient and attractive methods of packing that are offered by modern techniques of this nature.

Machinery for Disposal

The disposal of the large quantity of modern civil engineering plant used for the construction of the Owen Falls hydro-electric scheme is being undertaken by George Cohen Sons and Co.

Notable among the hundreds of items to be sold are: excavators, tractors, dumpers, dump trucks, derricks, steam cranes, diesel locomotives, air compressors, pumps, and hoists and lifting tackle of all kinds together with a number of complete plants for batching and mixing concrete, sand washing, etc.

All the plant is of the most up-to-date design and has been carefully maintained. Steps will be taken to ensure that every item is in good working order prior to shipment.

Machinery and Equipment

Lighting for Modern Food Store

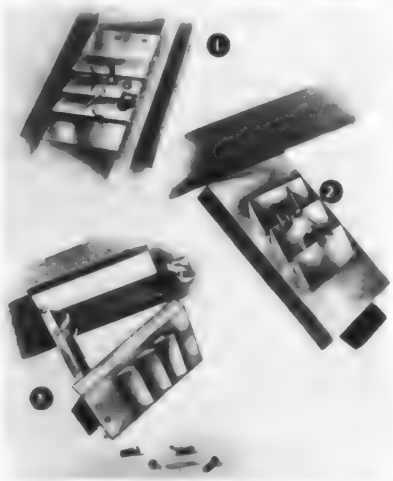
How carefully planned lighting can effectively contribute to the general efficiency and hygiene of the modern food store is amply demonstrated at David Greig's new branch at Canterbury.

The building is designed in the contemporary style with a high, reinforced concrete roof and, on aesthetic grounds, the architect considered lighting fittings suspended by wires or chains to be unsuitable. Instead, he advocated some indirect form of lighting which would provide a good level of illumination and, at the same time, simplify installation and maintenance.

It was therefore decided to use Philips Weybridge spotlight fittings with 500w. internally silvered lamps for the main general lighting. These were mounted on the side walls 9 ft. from the floor and 6 ft. apart. The training angles were arranged so as to keep the brightness of the ceiling —which was 20 ft. high with a span of 30 ft.—as uniform as possible.

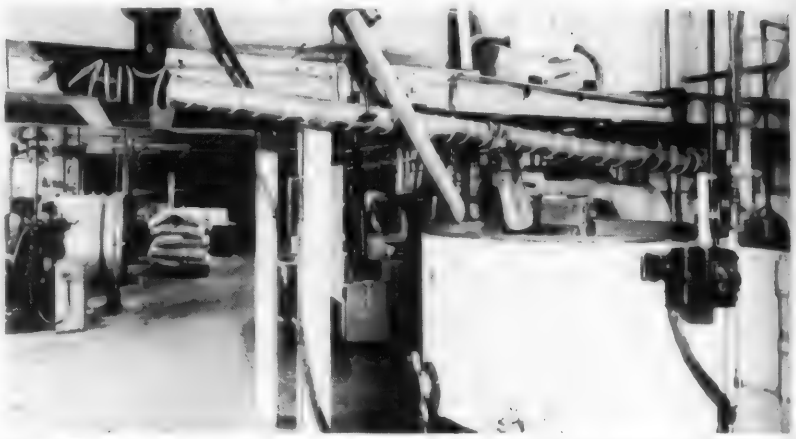
Magnetic Equipment

Specially designed to facilitate the removal of tramp iron and ferrous particles from permanent magnets,



the Rapid Ejecta plate has the general appearance of the previous Magnaplate. The face has two auxiliary poles hinged and held magnetically in position, on swinging the plate clear of the chute for cleaning (fig. 2), two cams operate against the face plate initially breaking the magnetic circuit, thus permitting the face plate to be easily swung clear of the magnet unit (fig. 3), the auxiliary poles, no longer under magnetic influence, allow the collected iron to fall.

The plate can be supplied in many widths and the magnet strengths are available in two sizes capable of handling up to approximately 4 in. depth of feed.



Electrothermal pipe heater used on a chocolate pipe line in the factory of the British Couverture Co.

Pipe Heaters

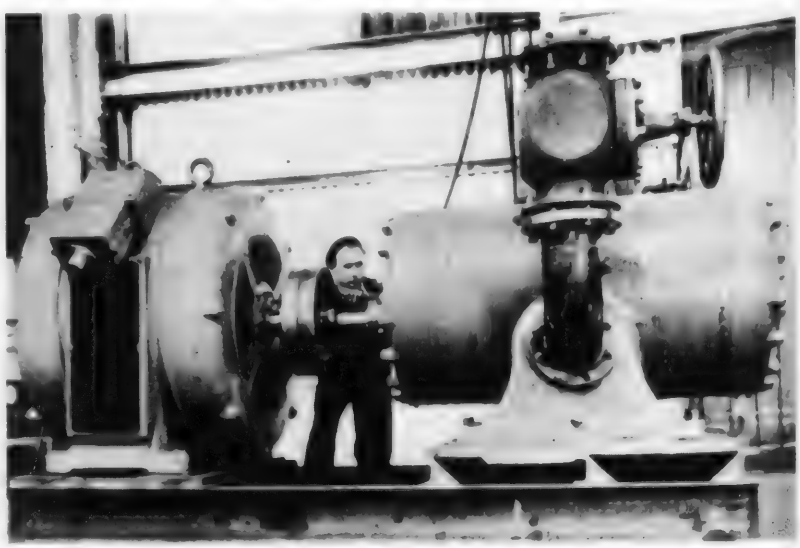
A further addition to the range of flexible electric heating devices developed by Electrothermal Engineering Ltd. is a heating network sealed into a high temperature resisting grade of polyvinylchloride. It is waterproof and is intended to provide a simple and efficient means of heating pipes in exposed positions in plant.

Approximately ½ in. wide, the heater is available in 50 ft., 25 ft., or 12·5 ft. lengths for operation on mains or other voltages as required. The electrical loading for each size is 7 watts per linear foot. Each heater has a connector at each end, but it is necessary to connect the supply to one only. Up to four 50 ft. heaters may be joined to give a 200 ft. length and the supply fed to one connector only. Thus one feeder point will supply a total length of 400 ft. of heater.

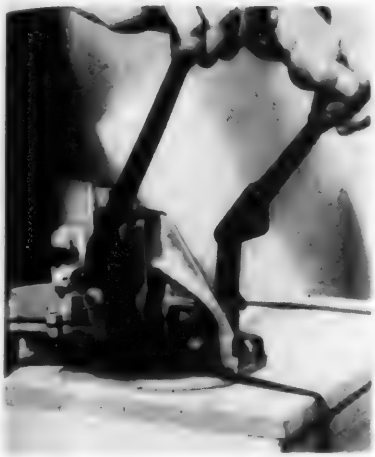
On pipes fitted with heat insulation, single tracing with the heater will give frost protection on up to 2 in. diameter pipes during periods of 30°F. of frost. Pipes of larger diameters can be multiple traced or the heater can be wound on to them as a slow spiral. Pipes and other fittings can also be maintained at higher temperatures than those required for frost protection, *i.e.* where viscous liquids must be maintained above a certain temperature in order to keep them free flowing.

The heater is suitable for raising the pipe temperature to 65° C. The contents of the pipe may be allowed to reach a temperature of 100°-120°C. without damage to the heater, but it must not be switched on during any period when the pipe temperature is above 65°C.

It can also be used as an immersion heater for maintaining the temperature of plating or pickling baths. The insulation is resistant to most inorganic salts and acids up to a temperature of 60°C. and concentrations of not greater than 50 per cent.



A rotary booster-compressor of some 300 h.p., suitable for certain low temperature duties (*e.g.* quick freezing), is being manufactured by York Shipley.



The new Signode seal feed machine for strapping cases, cartons, etc.

Seal Feed Strapping

Designed for strapping cases, cartons, etc., particularly on centralised or conveyor systems, the new Signode seal feed machine is provided in models for $\frac{5}{16}$ in., $\frac{3}{8}$ in., and $\frac{1}{2}$ in. steel strapping. When used in conjunction with the tool mount, strapping applications are speeded up and the counterbalanced arm permits it to swing into correct strapping position without effort. When the strapping is completed, the machine may be raised free from the package.

Seals bearing the user's trade or brand name can be supplied by the company at the additional cost of the necessary block.

Pneumatic and Lubricating Equipment

Pneumatic and lubricating equipment, together with the British Bellows pneumatic equipment, manufactured in Britain by Geo. H. Hughes Ltd., for which the company have complete selling rights, are available from Benton and Stone.

Included in the pneumatic range of equipment are double acting cylinders from $\frac{3}{4}$ in. to 6 in. diameter, and a slightly more restricted range of single acting cylinders. Almost any stroke, together with various mounting arrangements, are available.

Valves are made in two sizes, from $\frac{5}{16}$ in. to $\frac{1}{2}$ in. o.d. copper tube connexions, and give a range of hand, foot, automatic, semi-automatic, pilot, trip, etc., operations. In the auxiliary range are air service units, filters, and reducing valves.

Products of the lubrication section consist of mechanical and two hand-operated systems. The first of the hand-operated systems is the One-Shot, giving predetermined independent metering to each lubricating point. The second is the Benston, which discharges the total output of the hand pump throughout the distributors, giving proportionate metering.

Fractional H.P. Motors

A new range of fractional horse-power A.C. motors, similar in appearance to the present G.E.C. designs but more compact and of less weight, has been produced by The General Electric Co. The new motors, which comply with B.S. 2048: 1953 "Dimensions of F.H.P. motors" are mechanically interchangeable with other makes complying with this specification. Apart from the flange-mounted motors, they are also interchangeable with American motors made to the American N.E.M.A. Standard.

The stator laminations of the new motors are accurately stacked and riveted under high pressure to ensure maximum rigidity. The ends of the stator pack are finally spigoted true with the bore for mounting the bearing brackets. A one-piece pressing, screwed securely to the stator, ensures correct centre height and accuracy of alignment of the foot-mounted motors. Where silent operation is required resilient mounting is provided. This is done by using a rigid pressed steel base that supports the motor from the nose of the bearing brackets on which resilient end rings, resistant to oil and ageing, are fitted. These end rings absorb vibrations and ensure quiet operation.

Ultra-violet Rays in Industry

An exhibition to demonstrate the use of ultra-violet rays in industry and commerce was staged recently by Hanovia Ltd., in conjunction with the East Midlands Electricity Board.

In a number of industries, it is desirable to cause the molecules of a substance to combine with each other in order to form a product with entirely different properties, *i.e.* polymerisation, and in certain cases the process can be initiated or accelerated by the action of suitable radiation.

Ultra-violet radiation is also used in the commercial production of vitamin D, by irradiating ergosterol, a valuable oil extracted from yeast.

In many industries manufacturers wish to know whether their products will stand up to continued exposure to strong sunlight. By means of a powerful ultra-violet lamp, such as the Hanovia U.V.S. 500, the effects of many months' exposure to tropical sunshine can be simulated in a few hours. These lamps can be incorporated into complete weatherometers, which subject the sample to all types of extreme climatic conditions.

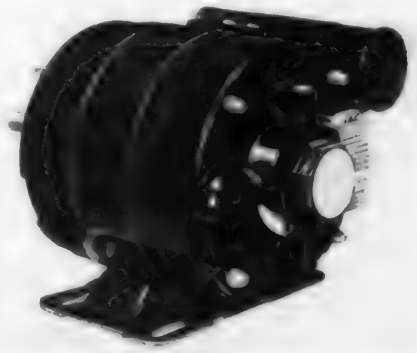
In many of these processes, the radiation employed is confined to the upper end of the ultra-violet band. It has been demonstrated, however, that radiations of a shorter wavelength with a peak in the neighbourhood of 2,600 Ångström units are highly bactericidal, and will destroy all known forms of bacteria, viruses, and moulds. To utilise this effect, special mercury vapour discharge tubes are employed, with an output almost entirely of radiation at 2,537 A.U. Such tubes are widely employed in a variety of situations for the disinfection of air. They are particularly valuable for protecting foods and pharmaceutical products from airborne contamination during storage and during packaging. Installed in the lid of a storage tank, Hanovia bactericidal lamps will prevent mould formation on sugar syrups and fruit juices, it is claimed. Mounted suitably over conveyor belts and bottling machines, they will reduce, if not eliminate, the risk of harmful organisms entering into bottled products during the packaging processes.

The same principle is employed in the Hanovia water steriliser, which is capable of treating up to 2,000 gallons per hour of contaminated water without changing in any respect its taste or chemical properties. Such a process is of particular value in situations where the use of chlorination is forbidden or undesirable.

Long-wave radiation can be used for chemical analysis, for distinguishing between various strains of barley, and for the detection of minute traces of adulterants in foodstuffs and other materials.

A further development is the use of the fluorescence lamp in conjunction with suitable fluorescent inks for the detection of cracks and porosity in metal castings and plastic and ceramic mouldings.

The use of the phenomenon of fluorescence has been extended to examination of microscopic specimens, where either by the natural differential fluorescence of the structures to be examined or the use of fluorescent dyes greater contrasts can be obtained, and in many cases detection of such things as bacteria can be made with lower magnification than is possible with normal methods. The fluorescence microscopy lamp is specially designed for this purpose.



One of the new range of fractional horse-power motors developed by G.E.C.

World Food News

Australian Canning Convention

Two hundred delegates from five States, representing canners' and fruit growers' organisations, can makers and suppliers of canning machinery, and research and extension officers serving the fruit and vegetable canning industry, attended the Sixth Australian Canning Convention held in Adelaide from September 20 to 23. Technical discussions comprised a large part of the programme of the Convention and were concerned with marketing for home and export markets, developments in the canning industry, and the economics of harvesting the three major canning fruits—apricots, pears, and peaches.

New Laboratory for Dutch Can Makers

Named the Carle C. Conway Laboratory after the former President of the Continental Can Co., who developed the close association between the American firm and existing companies outside the United States, a new industrial research laboratory has recently been constructed and opened by the can manufacturing firm of Thomassen and Drijver Blikemballagefabriek N.V. of Deventer, Holland.

This Dutch concern has been associated with the Continental Can Co., of New York, and the Metal Box Co., of London, since 1934 and from the early days of this association had been conducting its research in a specially equipped section of the main factory building. Since the war, however, production has increased rapidly, total production in 1953 reaching about 320 million cans, and maximum daily capacity rising to some two million cans.

In view of this rapid growth and the corresponding necessary expansion of plant requirements, and the fact that the company began to extend the field of its investigations, the erection of a new laboratory became necessary.

As well as containing offices, library, and conference room, the new building houses a chemical and bacteriological laboratory with experimental kitchen, a quality control department, a technical laboratory, and a photographic department.

There is also a large packaging laboratory, where packaging methods used in the food preserving industry are tested. Further testing on packaged food is carried out in a hot room equipped with a steam generator, a series of retorts and a rotating retort, blanching and thermal exhausting equipment, and closing machinery. Apparatus for measuring and checking the inner temperature of products undergoing treatment has also been installed.

Visitors from Australia

At present visiting Britain with a view to studying the application of new and continuously operating equipment suitable for the food manufacturing industry in Australia and New Zealand is Mr. A. T. Roche, general manager of Brookhouse Holdings Ltd. of Sydney, parent company of Aston Underwood Pty. Ltd., agents and importers, and of W. H. Brookhouse Pty. Ltd., food manufacturers.

Production levels in both Australia and New Zealand are now justifying the installation of such equipment to meet the demands of the rapidly expanding populations in these countries.

The packaging laboratory, part of the industrial research laboratory recently opened by Thomassen and Drijver, showing four small retorts.

India Bans Starch Imports

To help the indigenous starch industry, the import of starch into India has been totally banned.

Annual requirements are estimated at 65,000 tons. During 1953, Indian starch production totalled about 17,194 tons. During the first seven months of 1954, the output rose to 24,000 tons.

Nutrition and Vitamins

The Transactions of the International Congress on Vitamins held in Milan last year are now available in book form. It contains the reports, communications, and interventions in the debates in the following subjects: Vitamins in Zootechnology; Vitamin Requirements and Intake; Vitamins and Antibiotics; Endogenous Formation of Vitamins; Vitamins in Pharmacology; Vitamins and Enzymes; The Antivitamins; Hypovitaminosis; Blood and Vitamins; and Heart and Vitamins.

The complete texts of all papers are published in the original language of the speakers, together with summaries in English, French, German, and Italian.

The book is available from the National Research Council, Rome, at a price of 4,000 lire.

India Tackles Packaging Problems

Patra's Director of Research, Dr. G. L. Riddell, has been asked by the Food and Agriculture Organisation to go to India to advise on the setting up of a package testing and research station at Mysore. The proposed station is part of a general plan by the Central Food Technological Research Institute, Mysore, to improve India's food resources.

According to Dr. V. Subrahmanyan, Director of the Mysore Food Research Institute, one of the main packaging problems in India is to provide containers and materials which would be efficient and, at the same time, be within the reach of the masses who are generally poor.

The types of container used in Europe and America are generally very expensive in India, and many of them do not meet the country's requirements. One of the main purposes of Dr. Riddell's visit will therefore be to examine the problems with special reference to the packaging of Indian food products. Having studied the situation, he will advise the Institute on the package testing equipment they should obtain, make recommendations for a programme of research, and arrange for the training of scientific staff to take charge of the work after he leaves.

New Whipping and Thickening Agent

An instantly soluble "aqualised" product has been developed by Soluble Products Co., New York. It is claimed that upon introduction to ice cold milk or ice cold malted milk, it will cause a quick, creamy-like increase in viscosity, will considerably increase the whipping properties of the drink, and, in addition, will hold the whipped air uniformly throughout the entire product. Furthermore, when used in chocolate milk beverages, it will prevent the settling out of the cocoa powder and at no time requires any heat.

Aquacel No. 126, as it is called, is especially adapted for use with consumer chocolate powder beverages and for fountain use wherein it would be pre-mixed with a certain amount of malted milk powder. A further use would be in the preparation of powdered ice cream dessert where no heat is used in preparation.

Food Education in Australia

Mr. J. Chandar Anand, of the Central Food Technological Research Institute, Mysore, India, and Mr. Tony Hanifa, from the Department of Agriculture in Kandy, Ceylon, both studying food technology in Australia under the Colombo Plan Technical Assistance Scheme, are making a survey of Australian production methods.

Mr. Anand, who has been in Australia for 18 months, specialises in microbiology and food fermentation. A graduate of Punjab University, he has had 10 years' experience in food technology and is now working for his M.Sc.

The C.S.I.R.O. has made special facilities available to him for the research he is carrying out in its food preservation laboratories at the State Abattoirs, Homebush, 11 miles from Sydney, New South Wales. At these laboratories continuous research is conducted into the preservation of all types of foodstuff with the exception of meat and cereals.

Mr. Hanifa was working as an agricultural chemist with the Department of Agriculture, Kandy, when he was chosen to study in Australia.

On his return to Ceylon next year, he will be attached to the Galoya River Valley Development Project, the biggest multi-purpose project in the country. Situated on the eastern coast, the project aims at the reclamation and irrigation of a large area, as well as the establishment of farms and the growing of food crops.

He is one of the many students from Pakistan, Ceylon, India, and Indonesia who are taking a two-year course in food technology at the New South Wales University of Technology, Sydney.

During their 18 months in Australia, both men have travelled to interstate laboratories of the C.S.I.R.O. in Queensland, South Australia, and Victoria. They have also visited food factories in the various States.

Mr. J. Chandar Anand discusses a test with Mr. J. Kefford, principal research officer of the C.S.I.R.O. An article by Mr. Kefford begins on p. 439.

Most of the factories visited have a production far larger than those of India or Ceylon, but they were particularly interested in one small plant outside Brisbane, Queensland, which produces only a few thousand cans of fruit a day.

This plant's production approximates those of some Indian and Ceylon plants. Both Mr. Anand and Mr. Hanifa considered that the production methods of this small factory could be applied to similar plants in their own countries with good results.

Asked by Mr. J. Kefford, principal research officer in Sydney of the Division of Food Preservation of the C.S.I.R.O., about the application of his researches to India's food problems, Mr. Anand said:

"The Central Food Technology Research Institute, in Mysore, aims at the efficient and economic utilisation of food resources and is helping the industry to develop on sound scientific lines.

"Most of the research work in food technology is carried out in the Institute, which also co-ordinates work carried out by the C.S.I.R.O. at other centres.

"The Institute, which is also growing various experimental crops on the 150 acres attached to it, is divided into nine sections. These consist of processing, fruit technology, storage, biochemistry and nutrition, dietetics, microbiology and sanitation, quality control, engineering, and information and statistics.

"It has already been successful in producing nutritious and edible substitutes for such scarce items as milk, and rice and other cereals. These, and the advances made by other laboratories, together with multi-purpose projects aimed at soil reclamation, irrigation, and hydro-electric power, have brought India to the favourable situation where she will no longer have to contend with famine hazards."

Mr. Hanifa considers that what he has learned about dehydration and canning will be of particular interest in his future work. He has also gained a good insight into snap-freezing and deep-freezing methods of food preservation. Although this aspect of food preservation is of little interest to Ceylon at the moment, it is possible that the Government may establish such plants at a later date.

Cold Storage in Canada

Work has commenced on the Empire Cold Storage Company's one million dollar public cold storage plant, which will be one of the largest and most modern in Canada, utilising all the latest cold storage equipment and machinery.

It is expected that this plant will be completed and in operation on or about May, 1955.

Super-concentrated Grape Juice

A new super-concentrated grape juice has been developed by chemists of the U.S. Department of Agriculture for use in beverages and for flavouring ices, confectionery, carbonated beverages, and other foods. This new product is a six-to-one concentrate and offers many advantages in packing, storing, and transporting. It can be frozen or kept satisfactorily in a domestic refrigerator. In tests, it has been stored at 35°F. for a year without spoiling.

New Malayan Canning Factories

The multi-million dollar Amoy Corporation of Hong Kong is establishing two canning factories in Malaya—a M $1,000,000 plant in Singapore and a M $2,000,000 one in the Federation. Work has already started on the Singapore factory. Negotiations are in progress for a site for the Federation branch.

The Singapore factory, designed to can various local fruits and soya bean sauce, will have a floor space of 30,000 sq. ft., and is expected to be in production by the end of the year, or early in 1955. Canning machinery has been ordered from America.

The Federation factory will produce three main products of the Amoy Corporation—"Green Spot," sauce, and canned fruits.

The Corporation has, during the past three years, carried out experiments in growing vegetables in the Cameron Highlands for canning. The experiments have proved successful, including the growing of Chinese cucumbers not hitherto grown commercially outside China.

Paper tubes have replaced pallets in the handling of bagged materials on lift trucks in feed manufacturing.

Materials Handling in U.S.A.

In the bean and pea growing areas of Idaho, warehousemen are using a new system of handling field products. Until recently all crops were brought to the warehouses in 100 lb. bags; now, large boxes holding 44 bushels of beans are furnished free by the warehouse to the farmer for this purpose. This method reduces the cost of bagging in the field and enables the boxes to be unloaded from the truck and stored in a fraction of the time required for the same amount of bagged products.

Paper tubes have replaced pallets as a novel way of handling bagged materials on lift trucks in feed manufacturing. The five prong forks of the lift trucks are inserted into the expendable paper tubes discarded from newsprint rolls and cut to the proper length. Spacing of the cores and forks is suited to the load width.

Advantages of this system are claimed to be the elimination of costly hand handling after the bags are stacked as they come from the bagging machines, the ability to stack three or four loads high in the warehouse and later take them down without rehandling for loading, the reduction in damage to a negligible minimum, and the elimination of an exchange system or billing and crediting if pallets are used.

In both these materials handling developments, the Hyster lift truck can be used.

Wine Plant for Hungary

The famous red wine of Eger, the Egri Bikavér (Bull's Blood of Eger) is to be processed at Hungary's first large scale wine processing plant at Eger. The new plant will be capable of handling four tons of grapes per hour.

Dutch Change Flour Composition

Holland has altered the existing regulations concerning the composition of flour which will affect American and Canadian exports of wheat to the Netherlands, according to the International Federation of Agricultural Producers.

The proportion of domestic wheat used in flour has now been increased from 15 to 35 per cent. It is reported that this will mean Dutch millers will now use more Manitoba wheat from Canada in preference to American hard winter wheat.

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19 Whaling Expeditions this Season

Nineteen expeditions, two more than last year, will take part in the next whaling season which opens in the Antarctic in January. Japan will send an additional expedition, and shipowner Aristotle Socrates Onassis will be sending his Panama-registered "Olympic Challenger" expedition which did not participate last season. Norway will send nine, the same number of expeditions as last season, Britain three, South Africa, Holland, and the Soviet Union one each. Japan will have three expeditions. The total catch will be restricted as last season to altogether 15,500 blue whale units.

The International Whaling Commission has decided that the hunting of fin whales shall not start next season until January 7, instead of January 2, and blue whales shall not be hunted until January 21, instead of January 7. By delaying the opening of the hunting season, the whales should be bigger and yield more oil. It is expected that the 19 factory ships with more than 200 catcher boats will have used up the total permitted whale quota by mid-March.

Nutrition Congress

Over 360 delegates from 32 different countries attended the Third International Congress of Nutrition held at Amsterdam under the auspices of the International Union of Nutritional Sciences, during which some 67 communications were presented.

The following officers were elected:

Hon. Joint Presidents: Prof. H. Dam (Copenhagen) and Prof. B. C. P. Jansen (Amsterdam).

Chairman: Prof. E. J. Bigwood (Brussels).

Secretary-General: Dr. Leslie J. Harris (Cambridge).

It was decided to hold the Fourth International Congress in Paris in 1957.

New Maize Grader

A new maize grading machine, invented and constructed in the Tweed district of northern New South Wales by Mr. Harry Buttsworth, of Cudgera, and Mr. E. McCarthy, of the Gatton Agricultural College, Queensland, was recently inspected by a group of Department of Agriculture experts and district growers.

Mr. L. R. Kavanagh, maize expert of the New South Wales Department of Agriculture, said that, with minor modifications, the grader would do a good job. If it were a success and could be produced at the estimated cost of £A150, it would be well within the financial reach of most growers.

The new machine is of the revolving cylinder type, with holes and slots in regular series along its length.

At present all seed maize has to be sent for grading to central points in the State, where there are special large machines, some costing thousands of pounds. The bagging and handling of crops for grading is costly and inconvenient.

OVERSEAS ENQUIRIES

Codfish for Cuba

Sr. Santana Miguel Dotta, Hartman 807, Santiago de Cuba, is interested in handling a good line in codfish.

Firms interested in this enquiry should write by air mail, giving full particulars of their offers and quoting c.i.f. prices in U.S. dollars.

*

Coffee, Tea, and Foodstuffs

Mr. Horst Fröhlich of Horst Fröhlich oHG, Hermes Kaffee, 1—3, Alt Tempelhof, Tempelhof, Berlin, wishes to represent in the Berlin and West German market, United Kingdom suppliers of coffee, tea, and foodstuffs.

Suppliers interested in this enquiry should write direct to Horst Fröhlich oHG, giving full details of their offers and quoting c.i.f. prices.

News from the Ministries

Slaughter of Animals

The Slaughter of Animals (Amendment) Act, 1954, which empowers the Minister of Food to make regulations for preventing cruelty to animals in slaughterhouses and knackers' yards, came into force on October 1. Pending the making of regulations to give effect to recommendations of the Committee of Enquiry into the Slaughter of Horses, the Minister has made the Slaughter of Animals (Prevention of Cruelty) Regulations, 1954, which re-enact provisions of the Protection of Animals Act, 1911, and the Slaughter of Animals Act, 1933, which are repealed by the new Amendment Act. The Regulations came into operation on October 1, 1954.

Danish Bacon Contract Renewed

As a result of the further discussions in Copenhagen between the representatives of the Danish Bacon Board and the British Ministry of Food about the Danish Bacon Contract, it has been agreed that the price paid in the year beginning October 4, 1954, shall be unchanged at 237s. 6d. per cwt. (c. and f. U.K. port) and that the contract shall be for 220,000 tons with limited tolerances around this figure to cover the uncertainties of pig marketing. These tolerances have been agreed as part of an arrangement to ensure reasonable regularity of supply to the United Kingdom and are to be expressed in terms of minimum and maximum shipments for each week.

Imports of Hen Egg Products

The following changes have been announced in the licensing arrangements for the import of certain hen egg products.

From October 1, 1954, imports of dried egg white (albumen), frozen egg yolk, and frozen egg white from non-sterling, non-dollar sources will be permitted under open individual licences which will be issued unconditionally and for an unlimited period.

For dried egg yolk and glycerinated yolk open individual licences, valid for six months from January 1, 1955, will be issued unconditionally in succession to current licences which expire on December 31, 1954.

Open individual licences, valid for six months from January 1, 1955, will be issued for dried egg, whole, in succession to current licences which expire on December 31, 1954, but importers will be required to make returns on a prescribed form to the Ministry of Food, Egg Division, Great Westminster House, Horseferry Road, London, S.W.1, at monthly intervals, showing actual imports to date and forward commitments.

Cottonseed and Palm Oil

The Ministry of Food has now disposed of its entire stocks of cottonseed and technical palm oil and no further offers for these items can be considered.

These commodities were included in the list of oils and oilseeds issued on July 12 for which the Ministry invited offers. Stocks of the other items included in that list still remain available.

Food Preservatives Investigation

The Preservatives Sub-Committee of the Food Standards Committee appointed to review the Public Health (Preservatives, etc., in Food) Regulations is at present investigating the use in food of substances which have emulsifying, stabilising, anti-staling, or foaming properties.

The Sub-Committee is anxious to have from food manufacturing or other interests, who have not already made submissions, information about the use, or proposed use, in food of such substances, the quantities employed in particular kinds of food, and the purpose of such additions. It would also be of assistance to have available biological and physiological information.

Any person or organisation desirous of making a submission is invited to write as soon as possible, to the Joint Secretary, Preservatives Sub-Committee, Ministry of Food, Food Standards and Labelling Division, Great Westminster House, Horseferry Road, London, S.W.1.

Carcass Beef from the U.S.

Arrangements have been made for private imports of a very limited quantity of carcass beef originating in and consigned from the United States of America to be purchased with dollars made available by the United States under Section 550 of the Mutual Security Act.

The beef available for purchase will consist solely of frozen dressed carcasses of United States commercial and United States utility grades.

Licensing details are given in Notice to Importers No. 678 (dated October 6, 1954). This is obtainable from the Import Licensing Branch, Board of Trade, 43, Marsham Street, London, S.W.1.

Milk and Dairies Regulations

REGISTRATION AND LICENSING AMENDMENTS

The Minister of Health, the Minister of Agriculture and Fisheries, and the Minister of Food, after having consulted the organisations representing the interests concerned, have made the Milk and Dairies (Amendment) Regulations, 1954, and the Milk (Special Designation) (Raw Milk) (Amendment) Regulations, 1954; the Amending Regulations came into force on September 30, 1954.

The Milk and Dairies Regulations require a milk distributor to be registered by each local authority in whose area he sells milk. The Milk Marketing Board, having resumed their marketing powers, buy producers' milk and sell it under contract to distributors and manufacturers. Just before the milk passes to the buyer it is deemed by contract to have been in the momentary possession of the Board.

The Board are, therefore, technically purveyors of the milk and as such would need to register as distributors with some 1,400 local authorities. This multiple registration is considered inappropriate, and the Amending Regulations exempt the Milk Marketing Board from the need to register as distributors, except where the Board are trading at or from premises where milk is handled by them.

The Milk (Special Designation) (Raw Milk) Regulations require a dealer in Tuberculin Tested Milk to hold a licence from the local authority. To cover the milk which the Board buy from producers as Tuberculin Tested, the Regulations have been amended to empower the Minister of Food to license the Board so that they, under contract, may resell the milk as Tuberculin Tested Milk to distributors and manufacturers. Such licence will not cover milk which is handled at or from the Board's own premises.

These regulations have also been amended to avoid hardship to those T.T. licence holders whose herds are in process of becoming attested, but which will not reach that status before the expiry of the current T.T. licence. Such producers may apply for renewal of the T.T. licence for a limited period of six months. In addition, the opportunity has been taken to provide for the renewal or granting of T.T. licences to producers owning non-attested herds (which are, however, of attested standard) in those parts of the country which have been, or will in future be, declared to be Attested Areas or Eradication Areas under the Tuberculosis (Attested Herds) Scheme, 1950.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Bottling of Mussels

B.7225. *We wish to manufacture bottled mussels and shall be glad of your assistance.* (Essex)

The mussels, which must be very fresh, are thoroughly cleaned and washed in salt water. They are then steamed for about 10 minutes, when the shells will open; they are afterwards emptied into suitable vessels, and the shells removed. The "beard" must be removed at this stage.

The cleaned meats are thoroughly washed and immersed from ½ to 3 hours in a 3 per cent. salt solution, after which the brine is drained off and the mussels immersed for 3 days in a 3 per cent. solution of distilled vinegar to which has been added 3 per cent. salt. The mussels are packed in glass jars, after which the containers are filled with spiced vinegar sauce, diluted with equal parts of water. The jars are then sealed and processed. Suitable times and temperatures must be ascertained by trial, but it is said to vary from about 60 minutes at 212°F. to 25 or 30 minutes at 221°F.

Non-processed pickled mussels remain in good condition from two to four months depending on the degree of skill used in preparation and on temperature of storage. The pack must be protected from light, since the meats gradually darken if light rays are too strong. Storage at temperatures from 34° to 40°F. increases the "shelf life" of both processed and non-processed packs.

Spiced Vinegar Sauce.—To 4½ quarts of 6 per cent. distilled vinegar are added:

	oz.
Bay leaves	½
White pepper	¼
Mustard seed	¼
Whole cloves	⅛
Fennel	⅛
Paprika	1/16

The spices are simmered, but not boiled, in the solution for 45 minutes. The spices are then strained out, the solution is filtered, and set aside to cool.

Chewing Gum

B.7226. *Please give details of the manufacture of chewing gum.* (Lincs.)

The following formula may be used as a basis for trial:

Granulated sugar	15 lb.
Skimmed milk powder	5 ,,
Gum chicle	20 ,,
Corn syrup	30 ,,
Fine icing sugar	30 ,,
Balsam tolu	1 ,,
Oil of spearmint	½ fl. oz.

The gum is crushed into small pieces, melted with a gentle heat, and strained through a fine stainless steel sieve to remove extraneous matter. The granulated sugar, corn syrup, and milk powder are cooked to 250°F. in a stirring kettle. The cooked batch is placed in a heavy duty steel Duplex mixing machine, the chicle gum added, then the icing sugar more slowly until the whole is thoroughly mixed to a paste. The spearmint is added and, when well distributed, the batch is transferred to a sugar-dusted slab. The mass is cut into conveniently sized slabs of ½ in. thickness, and passed through a gum rolling, sizing, and cutting machine.

If the gum is required for centres to be hard panned, the batch is cooked to 260°F., so that the centres will keep their shape when revolving in mass.

Balsams, waxes, or resins act as lubricators and eliminate tackiness in chewing gum.

Chocolate Butter Cream

B.7227. *Can you supply us with a formula for the production of a good chocolate butter cream?* (Devon)

The following could be used for trial purposes:

Lump sugar	3 lb.
Glucose	1½ ,,
Water	¾ pint
Unsalted butter	4½ lb.
Eggs	6
Melted chocolate	1½ lb.
Vanilla essence	*q.s.*
Chocolate colour	*q.s.*

The sugar, glucose, and water are measured into a copper pan, and the solution is boiled up quickly to 240°F., taking the usual precautions to prevent graining of the sugar. The eggs should be beaten up in the machine bowl, and then the sugar solution is slowly poured over the eggs, and whisking is continued until it is nearly cold and light. The whisk should then be removed from the machine and the butter beater put on, then the butter is gradually added to the mixture and the whole is well beaten up to a light, velvety cream. Some drops of vanilla essence and the melted chocolate are added to colour and flavour the cream. If the colour is not deep enough, sufficient chocolate colouring matter should be added to get it to the required colour. The cream is then ready for use as desired.

This butter cream will set firm and mellow when cold. It should be heated if this happens, and mixed to keep it soft and at a working consistency.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.7157. *Candy floss.* (Tasmania)
B.7160. *Confectionery tables.* (Inverness)
B.7161. *Pickled onions.* (Yorks.)
B.7162. *Boiling pans and steam boilers.* (Singapore)
B.7163. *Wooden forks for confectionery boxes.* (Sussex)
B.7164. *Macaroon paste from apricot kernels.* (S. Africa)
B.7165. *Lecithin in chocolate manufacture, self-raising flour, custard, and blancmange powder.* (India)
B.7166. *"Bloom" in chocolate products.* (Mon.)
B.7168. *Rice cleansing machinery.* (Glasgow)
B.7170. *Coffee roasting.* (Australia)
B.7171. *Monosodium glutamate and saccharin.* (Hong Kong)
B.7172. *Hot plate goods.* (Lancs.)
B.7173. *Wrappers and labels.* (India)
B.7174. *Pellets for poultry feeding.* (Singapore)
B.7175. *Equipment for check weighing.* (London)
B.7176. *Root horseradish.* (Mon.)
B.7178. *Cake mixes.* (Yorks.)
B.7183. *Aluminium casks and barrels.* (London)
B.7184. *Agar-agar.* (London)
B.7186. *Packaging machinery.* (Middlesex)
B.7187. *Potato crisps.* (New Zealand)

Recent Patents

714,973. DELACHENAL, E.: Machines for moulding and packing butter or the like.
714,981. SOC. DU BOUCHON COURONNE CROWN CORK CO. (FRANCE): Air-tight discs for bottle caps.
715,002. GENERAL ELECTRIC CO.: Refrigerator evaporator defrosting arrangements.
715,036. HOMANN, W. (trading as HOMANN-WERKE W. HOMANN): Cooking positions for gas ranges or cookers.
715,248. HOWIE, A., and OGSTON, T.: Appliance for washing eggs and other solid materials.
715,345. VICARS, LTD., T. AND T., HATTON, J. A., and CROMPTON, W. J.: Manufacture of wafers, waffles, and similar baked products.
715,351. DUNKLEY, M. E.: Processes for the treatment of food and other organic produce.
715,352. DUNKLEY, M. E.: Process for the treatment of oil-bearing vegetable material.
715,394. RUBERY, OWEN AND CO., LTD., MCCONNEL HINDS, LTD., and HINDS, G. A.: Apparatus for separating leaves and stalks from plucked hops.
715,425. KROYER, K. K. K.: Process and apparatus for the conversion of starch and other polysaccharides.
715,473. LEWIS, D., SMITH, W. J. M., SMITH, T. C., and SMITH, D.: Portable heads or lids for milk churns or other liquid containers.
715,496. WALLACE, W. J.: Bottle-cleaning machines.
715,500. KRAFT FOODS CO.: Process for making cheese of the Cheddar type.
715,601. FILTERWERK MANN AND HUMMEL GES.: Apparatus for the pneumatic sorting and or purifying of granular bulk materials, especially grain.
715,628. JORG, P.: Machine for shaping and packing butter and the like.
716,685. HEALY, M. M.: Egg substitutes.
716,689. DITEX FOODS, INC.: Sweetening of canned fruits and the like.
716,759. KRENS, C. A.: Bag for dispensing coatings for candies, cakes, and the like.

ABSTRACTS OF BRITISH PATENTS

Coating Pastries with Fondant

A machine is described for coating the side and top surfaces of pastries or other confectionery with liquid fondant or similar quickly crystallising or setting coating material. It comprises an open-topped heated coating material mixing tank, flow means disposed over the tank and spaced therefrom to deliver coating material in the form of at least one curtain directed towards the tank, and pump and conduit means to deliver coating material from the mixing tank to the flow means, wherein articles to be coated are supported on a wire tray removable from the machine for loading and unloading. The machine includes means to support the trays for movement through the curtain, such support extending between the tank and flow means in a direction transverse to the length of the curtain.

The tray supporting means may comprise endless conveyors spaced apart from each other in a direction transverse to the direction of movement thereof and on which wire trays are rested for movement thereby through the curtain.

712,443. *Reginald Charles Jahn.*

Fish-dressing Machines

In some machines for dressing herrings and similar fish, the backbone is removed by an appropriate tool and the skin lining the belly, which may conveniently be called the black skin, is also removed.

A satisfactory tool for removing the black skin takes the form of an abrasive disc which rotates at a high speed while its edge engages the black skin. This tool has been extensively used but has always been placed after the bone-removing tool, that is to say, the backbone has first been removed and then the disc has removed the black skin by a rubbing action.

According to the present invention, after the belly has been opened and the entire contents of the belly cavity have been removed, a rotary abrasive disc enters the belly cavity and rubs the inner belly walls and thereafter the backbone and ribs are removed. By this method, the boning action is considerably improved.

714,575. *Fisadco Limited.*

Phosphates improve Sausages

A meat sausage or other meat-containing product is described which incorporates a small proportion of a water-soluble alkali metal salt of an anhydrophosphoric acid, such as pyrometa-, or poly-phosphoric acid, or a mixture of two or more of such salts or a mixture of such a salt with an alkali metal salt of orthophosphoric acid. The addition of the phosphoric acid salts brings about a change in the colloidal condition of the meat fibres and a swelling of the tissue substance, whereby the latter is made more tender and easier to chew.

An addition of, for example, 0·3 to 0·5 per cent. by weight of the phosphate salt suffices to bring about the change in the colloidal condition of the meat substance. A larger addition may easily lead to too great a softening of the meat fibres and over-peptisation.

The addition, for example, of 0·5 per cent. of the phosphate salt to the usual sausage filling yields a well-bound, easily cuttable and spreadable sausage of good colour, which is succulent and tender to bite.

714,500. *Van Hees G.m.b.H.*

Sterilisation of Foodstuffs

The invention provides an apparatus for sterilising or pasteurising foodstuffs in stationary containers housed in a tank, box, or similar reservoir, by heating them by means of a mixture of air and steam and then cooling them in the same tank, box, or similar reservoir by means of damp air, wherein one or more fans and associated regulating valves are positioned in such a way that either the air in the box or tank may be made to flow in a closed circuit therein, or atmospheric air can be made to flow through the box or tank. The use of fans ensures a strong circulation of the heating or cooling medium along the containers so that the heating and the cooling are effected in a uniform and efficient manner.

The use of regulating valves makes it possible to cause large quantities of air to pass through the apparatus so that efficient cooling is attained. This cooling should be such that the foodstuffs are cooled as quickly as possible from the sterilisation or pasteurisation temperature to a low temperature, although bottles containing foodstuffs must not be cooled too quickly, or they will break. By suitable adjustment of the regulating valves, any suitable rate of cooling may be chosen.

The box or tank can be provided with one or more steam injectors, a heat exchanger communicating with a steam conduit, a heat exchanger communicating with a cooling conduit, and one or more sprays fed by a cold water conduit.

This construction allows, with the aid of suitable cocks, the same heat exchanger to be connected to a steam conduit or a cooling conduit according to what is required.

714,221. *Pierre Matthieu Constant Dekkers.*

Fermentation Beverages

It has been found that a particularly palatable fermentation beverage can be obtained by fermenting sugar-containing solutions in the presence of aromatic vegetable materials or if desired of an extract of the same prepared in a suitable manner with *Endomyces* species of the group which comprises the *Endomyces Magnusii*, *Endomycopsis*, and *Sachsia suaveolens*. In the main, ferments which ferment dextrose, laevulose mannose, galactose, saccharose, and raffinose—either all together or in various combinations—are concerned.

The beverage can be produced by using the *Endomyces* types with numerous plants, for example, the leaves of the *Cupuliferae* or *Rosaceae*. The hazelnut tree, the oak, the beech, the wild briar (dog rose), strawberry, raspberry, blackberry belong to the named plant families and among them are also to be found plants of less pronounced aroma.

714,119. *Otto Vosseler.*

ABSTRACTS OF FOREIGN PATENTS

Food Manufacturing Methods

Methods are described for the manufacture of foods based on cream and destined for the feeding of infants and invalids.

German 891,183. *K. Drögsler.*

Fruit Milling

A fruit mill with pressure discs is described in which the pushing gear, driven from the mill rollers by toothed gear or belt, can be stopped at will on disconnecting a coupling.

German 900,153. *Botsch.*

Potato Preparing Apparatus

A description of a potato preparing apparatus provided with a sorting machine, a selecting band, a feeder, forwarding and ancillary devices, and with connecting surfaces running parallel with large sectional surfaces and corresponding connecting means for easily releasable assembly, to form an apparatus which can be moved as a whole.

German 895,543. *Jabelmann.*

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COMPANY REPORT

Scribbans-Kemp

EVER-GROWING DEMAND

The 27th annual general meeting of Scribbans-Kemp Ltd. was held on October 7 in London, Mr. H. Oliver-King (chairman and managing director) presiding.

The following is an extract from his circulated statement:

This year proved to be probably the most difficult in operation since the end of the war. The trading profit reflects these difficulties in a fall of some £253,835 in profit before taxation. Nearly all the difficulties arose from the swift change-over to almost complete derationing. Inevitably this led to shops and stores throughout the country being filled with merchandise which had hitherto been unobtainable and caused the flow of trade to change direction for some foodstuffs, with the result that some raw materials were temporarily an embarrassment in regard to supply and price.

The year under review was a settling-down period which may continue for a time after the shake-up to complete freedom from rationing. In the change-over which is taking place, one of the most interesting things is the extraordinary time it is taking to restore over the whole country the very large selling and distributing system which to an organisation like ours is a necessity. The reconstruction is being vigorously pursued, although completion may take a little time.

Last year I reported the reconstruction and re-equipment of the Glasgow factory. Production has restarted on a satisfactory basis. Still further factory extension is taking place in Liverpool and plans are also under consideration for a very large expansion of the Grimsby organisation, and extensions at our Newcastle premises, all of which is an indication of the demand for the company's products, a demand which continues to grow.

The Overseas Corporation is showing much better results this year. Some export markets have been closed to us, and in Africa manufacturing has proved difficult, but Canada continues to be very successful and there is some improvement from the U.S.A.

The retail side of our interests has had a very good year, but there appears to be some recession in this branch since March, owing possibly to the vastly increased outlets for sugar confectionery. During the year some 10 branches have been closed and 30 new branches have been opened.

The Profit and Loss Account figure before taxation is £1,302,227 as against £1,556,062 last year. Taxation picks up this year an excess profits levy of £48,000 which will not occur next year. After deducting the amount left in subsidiaries, and allowing for full taxation, we are left with a figure of £431,635 as against £422,027.

In the Consolidated Balance Sheet, fixed assets have risen by approximately £750,000 without the necessity for extra capital, indicating a good deal of resilience in the structure of the business, and while so far expansion has been possible without asking for further monies it is obvious that future expansion might require additional capital.

Looking with a wary eye to the future, turnover and profits up to the time of writing are such as to cause the Board no anxiety.

The report was adopted and a total dividend of 12½ per cent. was approved.

Trade Marks

TEXTURATOR.—717,183. Machines for use in plasticising edible fats. **Clarke-Built, Limited,** Power Road, Chiswick, London, W.4; Manufacturers and Merchants.

PLUMROSE.—722,691. Butter, cheese, tinned milk, powdered milk, tinned edible cream, sausages, canned meat, canned fish, canned fruit, and canned vegetables. **Aktieselskabet P. and S. Plum** (a Company incorporated under the laws of Denmark), 26, St. Annae Plads, Copenhagen K., Denmark; Merchants.

QUICKCREM.—726,830. Dairy cream and dairy products consisting principally of dairy cream. **Milk and Cocoa Products, Limited,** 84, Brook Street, London, W.1; Merchants.

CENTURY.—727,608. Bread for sale in Lancashire, Yorkshire, and Cheshire. **Warburtons, Limited,** Back o' th' Bank Model Bakery, Hereford Street, Bolton; Wholesale Bakers and Confectioners.

LESME STAYRITE.—728,137. Chocolate. **Lesme, Limited,** Sunya House, Scrubs Lane, Willesden, London, N.W.10; Merchants and Manufacturers.

"LIDO."—728,323. Non-medicated sugar confectionery. **Robertson and Woodcock, Limited,** Trebor Works, Katherine Road, London, E.7; Manufacturers.

NOUGALONE.—728,419. Confectionery (non-medicated). **John S. Derbyshire and Son, Limited,** Kreemalone Works, Traffic Street, Nottingham; Manufacturers.

BLUE PRINCE.—728,791. Chocolate, chocolate confectionery, and sugar confectionery, none being medicated. **Somportex, Limited,** 4, Copthall Buildings, Copthall Avenue, London, E.C.2; Manufacturers and Merchants.

DANCANA.—728,930. Edible fats. **John Sharphouse and Sons, Limited,** 12, Providence Street, Wakefield, Yorkshire; Merchants.

FROSWEET.—729,143. Non-medicated sweetmeats. **York-Jones, Limited,** The Spa Ice Creamery, Vines Lane, Droitwich Spa, County of Worcester; Manufacturers.

ANNETTE.—729,227. Cheese. **Børge Hansen,** 6, Holstebrovej, Skive, Denmark; Merchant and Manufacturer.

DIXETTS. — 729,283. Non-medicated confectionery. **Henry Dixon (Confectioner), Limited,** Britannia Works, Love Street, Sheffield, 3; Manufacturers and Merchants.

New Companies

Betta Pie Company (Northern), Limited. (536156.) 1, Paley Street, Sunderland. To carry on business of manufacturers, of pies and cooked meats, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: J. Stephenson, Mrs. A. Stephenson, and J. F. Stephenson, all of Redhill, Whitburn, Co. Durham.

G. Woodley, Limited. (536175.) 47, Denmark Hill, S.E.5. To carry on business of manufacturers of and dealers in sugar, chocolates, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: G. J. Woodley and Elsie Woodley, 47, Granville Avenue, Hounslow, Middlesex.

Lenvale Products, Limited. (536242.) 6 and 7, Middle Row, Maidstone, Kent. To carry on business of manufacturers of and dealers in agricultural and horticultural products, insecticides, etc. Nom. cap.: £100 in £1 shares. Dirs.: E. W. Harrison, Hawkenbury Hall, Staplehurst, Kent; A. D. Harrison, Ecclesbourne, Harrietsham, Kent.

William Annible and Son, Limited. (536302.) 7, East Street, Crowland, nr. Peterborough. To carry on business of bakers and confectioners, dairymen, pastrycooks, etc. Nom. cap.: £2,000 in £1 shares. Permt. dirs.: W. W. Annible and Mrs. G. Annible, 20, Lynton Road, Peterborough; G. E. Annible and Mrs. E. Annible, Portland Road, Crowland.

Carnforth Food Products, Limited. (536325.) 1, Dalton Square, Lancaster. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: S. Cottam, Post Office, Over Kellet, Carnforth; T. E. Jackson, Cross House, Arkholme, Carnforth; N. Jacobs and F. I. Townsend.

Altona Products, Limited. (536327.) 43, Heaton Road, Newcastle-on-Tyne. To carry on business of manufacturers of and dealers in chocolates, confectionery, ice cream, etc. Nom. cap.: £200 in £1 shares. Dirs.: B. W. Holden and Mrs. A. Holden, 24, Patterdale Gardens, Newcastle-on-Tyne.

Clarence Bourne, Limited. (536339.) Mill Street, Clowne, Derbyshire. To carry on business of millers and manufacturers of animal foods and compound feedingstuffs, etc. Nom. cap.: £80,000 in 5s. shares. Dirs.: C. A. Bourne and Olive Bourne, Church Close, Clowne.

Dora Rogers (Enterprises), Limited. (536365.) 250, Terminus Road, Eastbourne. To carry on business of manufacturers of and dealers in confectioneries, chocolate, and sweets, restaurant proprietors, etc. Nom. cap.: £1,000 in £1 shares. Dir.: Dora Rogers, 26, Grange Road, Eastbourne.

Bobo, Limited. (536391.) Bank Chambers, 280, Euston Road, N.W.1. To carry on business of confectioners, manufacturers of and dealers in sweetmeats, candies, toffee, chocolate, etc.; in particular chewing gum and Bubbly gum known as "Bobo." Nom. cap.: £100 in £1 shares. Permt. dirs.: Mrs. G. Rose, 4, Seymour Street, W.1; Mrs. J. A. Rose, 13, Shirehall Lane, N.W.4.

Caerphilly Wholesale Meat Supplies, Limited. (536392.) Central Chambers, Caerphilly, Glam. Nom. cap.: £3,000 in £1 shares. Dirs.: A. I. S. Barker and Mrs. B. T. Barker, Brynhyfryd, Mountain Road, Caerphilly.

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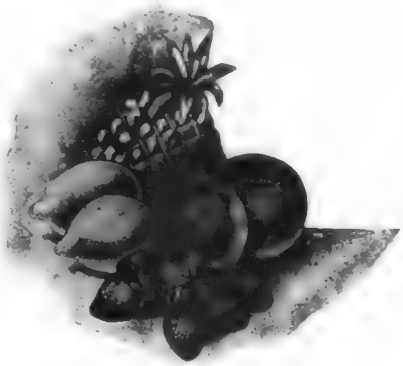

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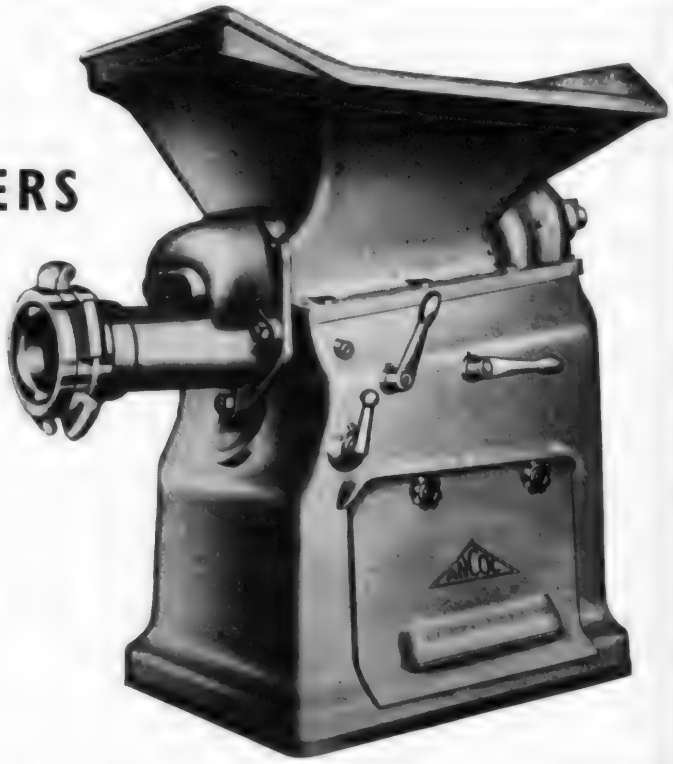

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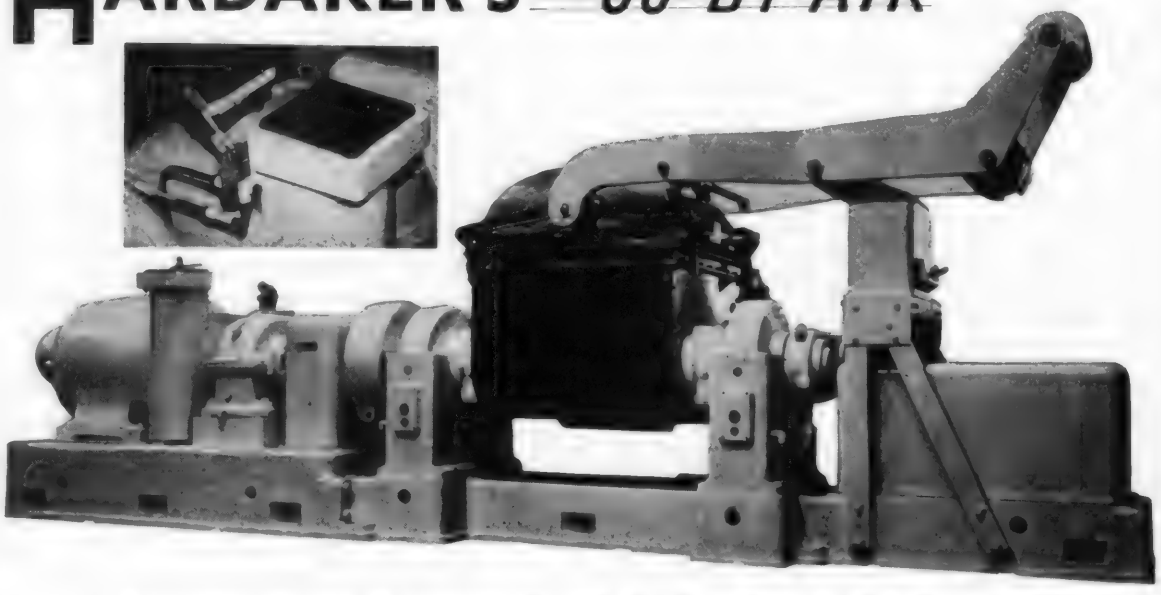

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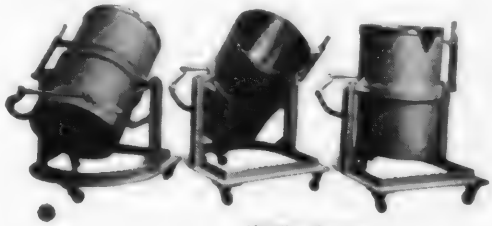
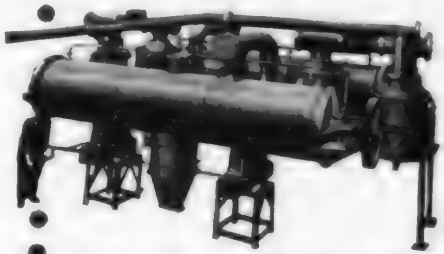


40 gallons Stainless Steel Yeast Containers



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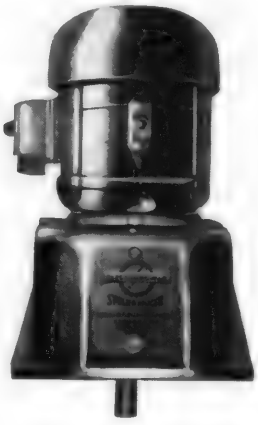
★ IN USE THE WORLD OVER
★ SPEED INCREASE GEARS
★ ANY TYPE OR MAKE OF MOTOR FITTED



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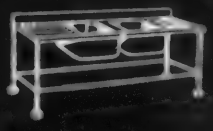

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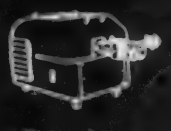

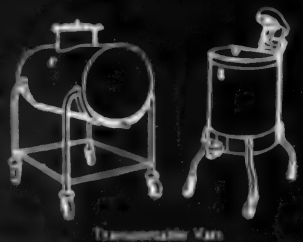

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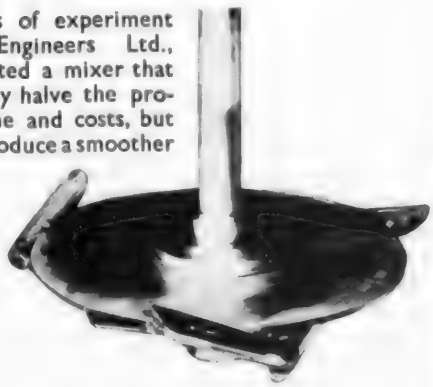

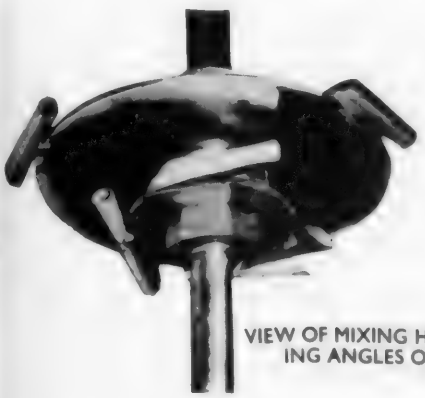

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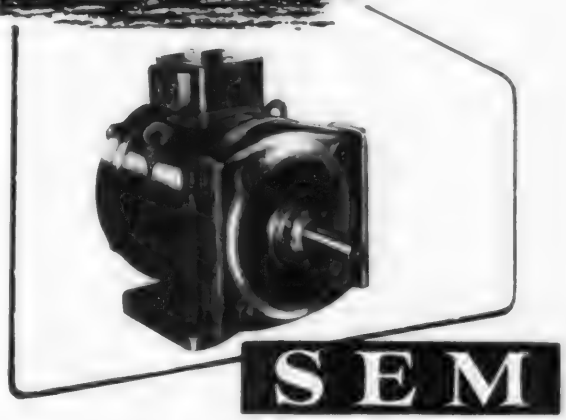

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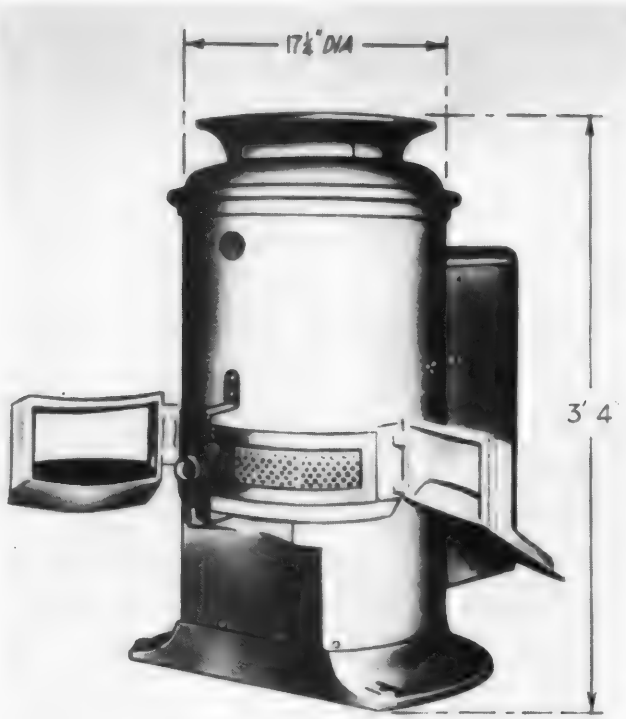

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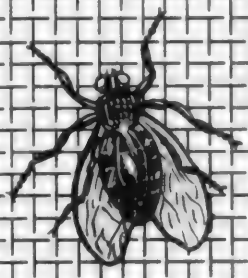

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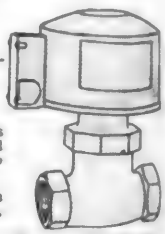

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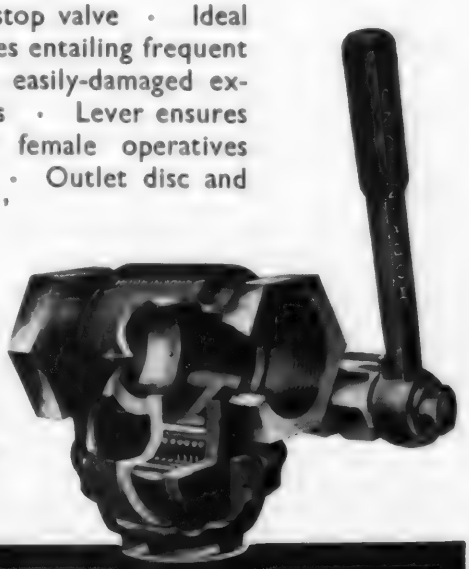

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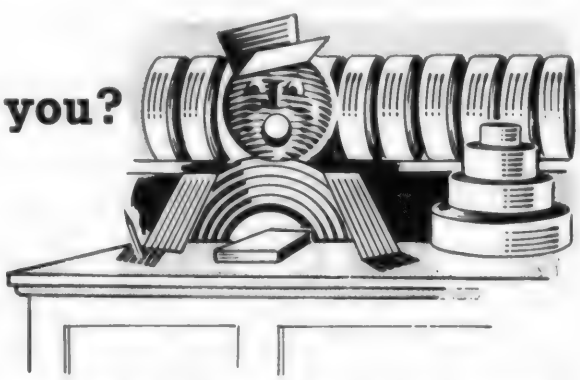

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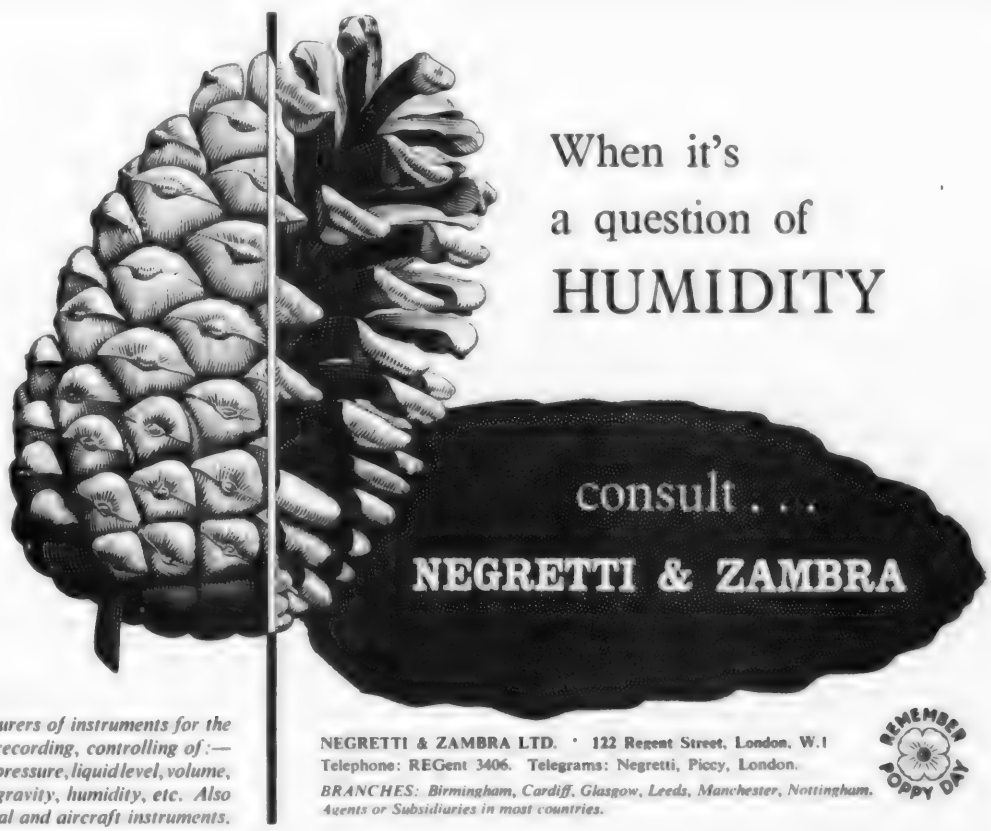

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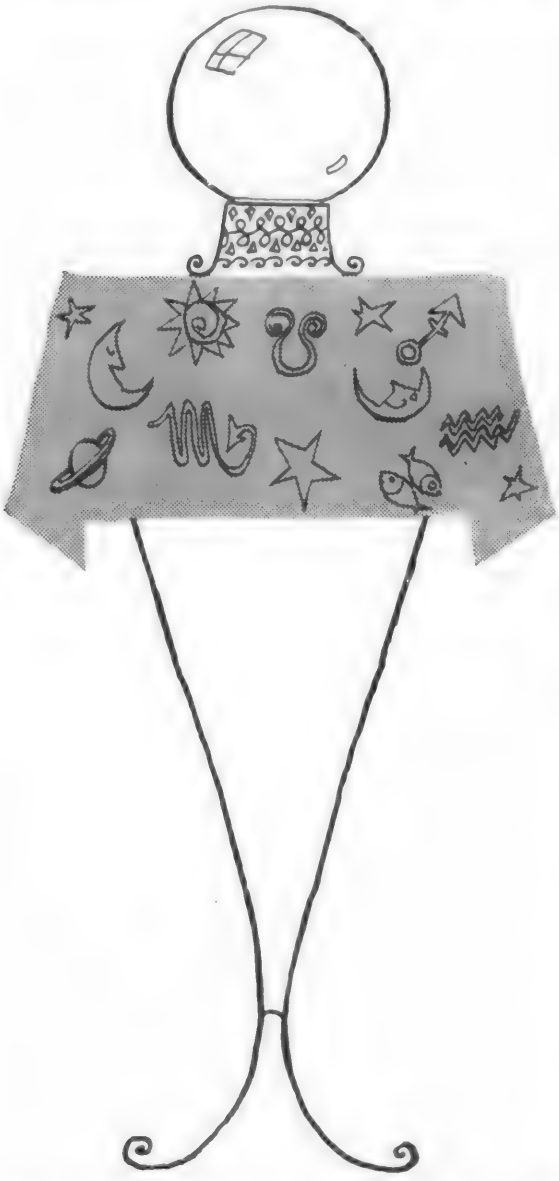

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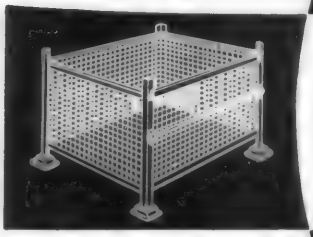

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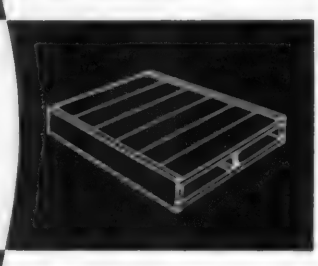

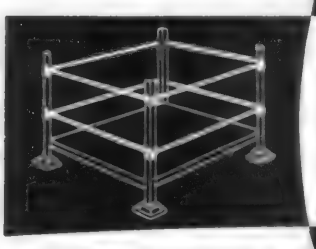

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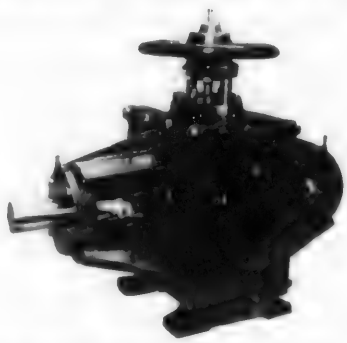

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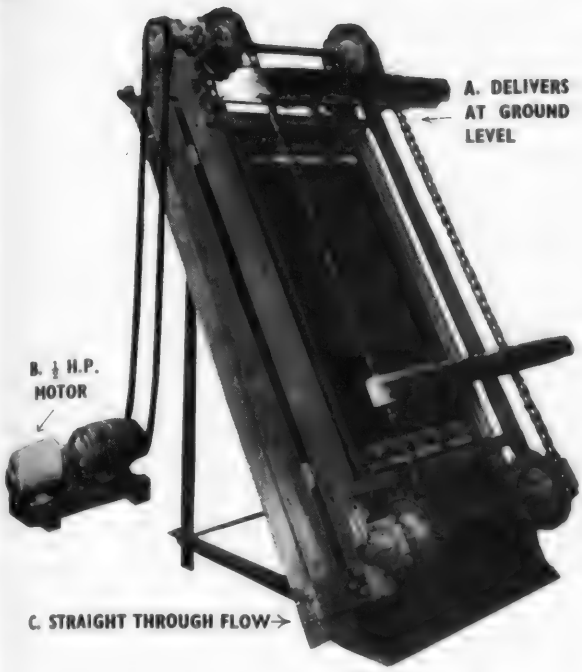

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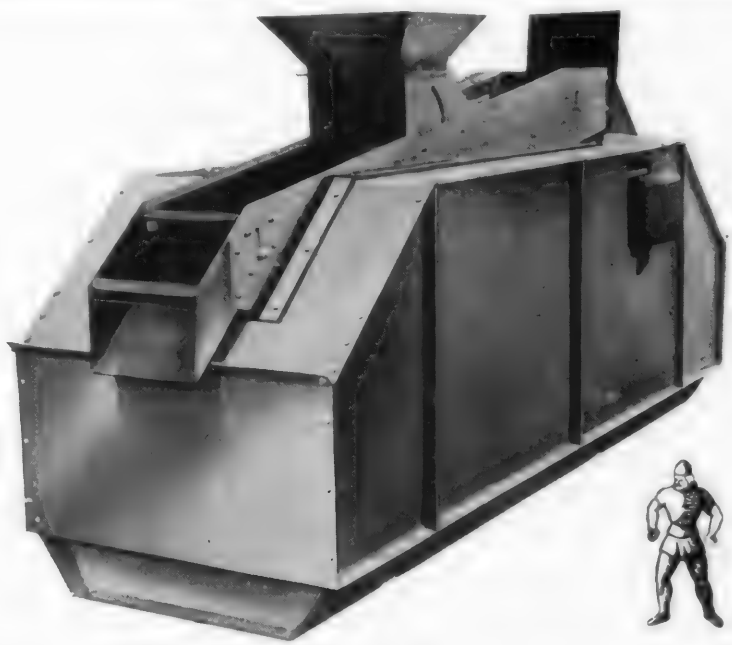

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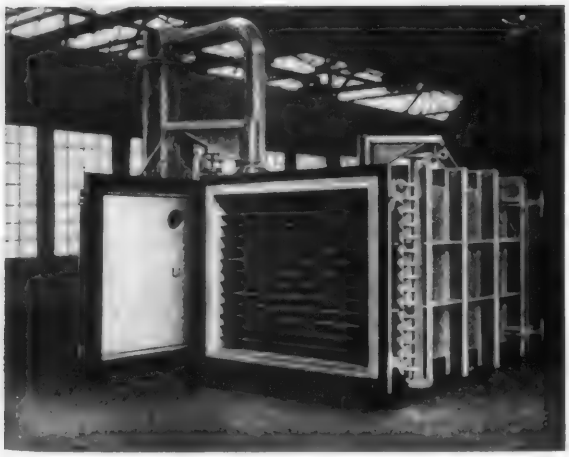

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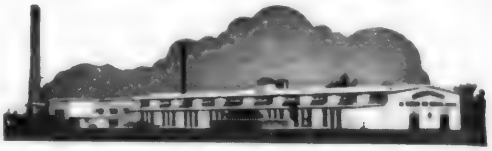

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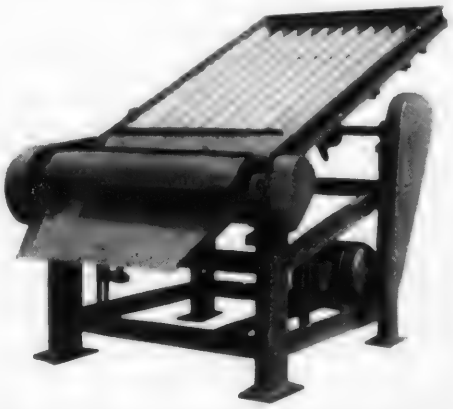

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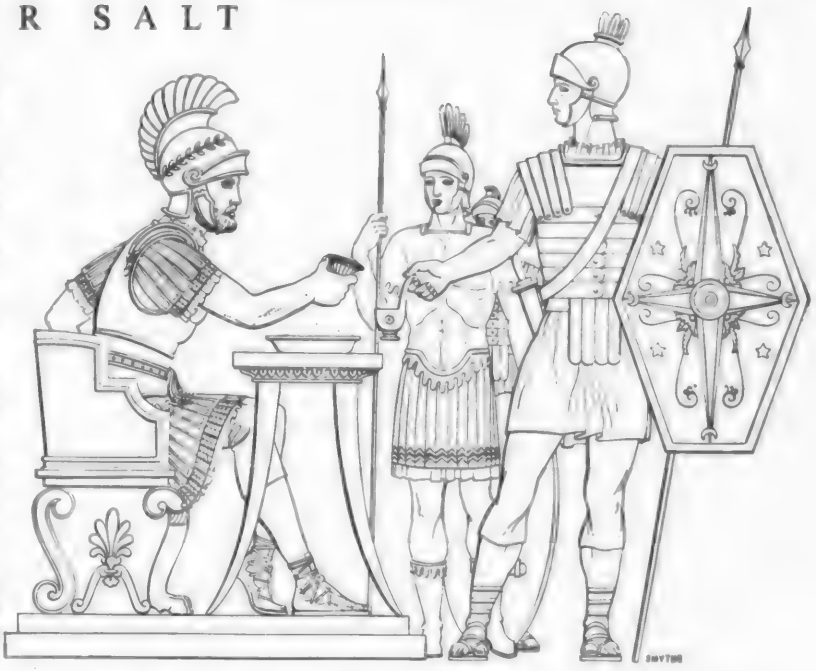

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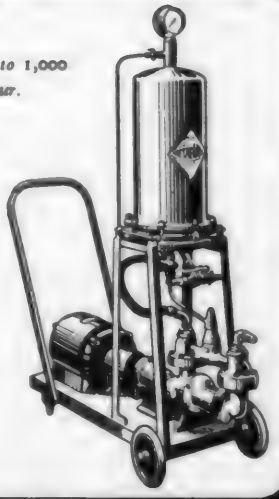

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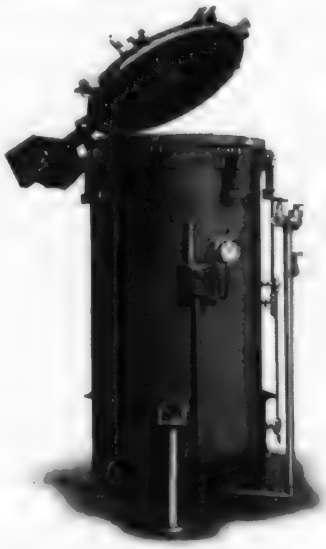

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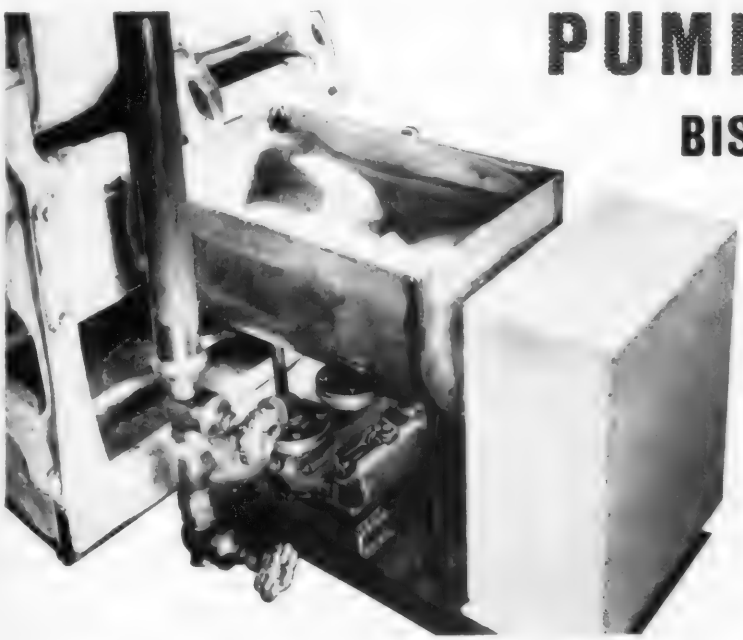

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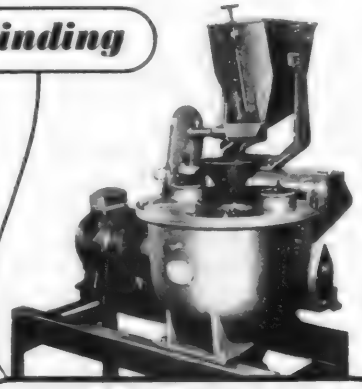

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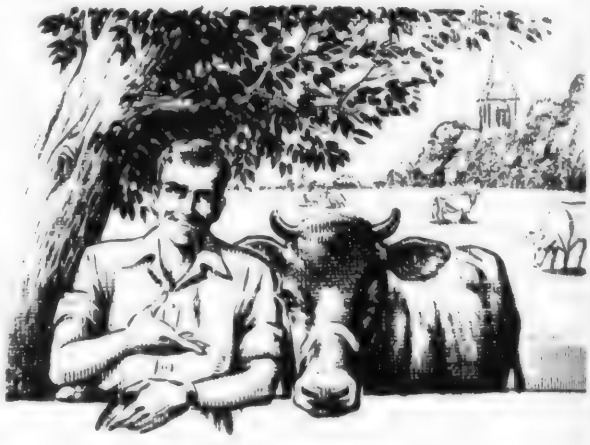

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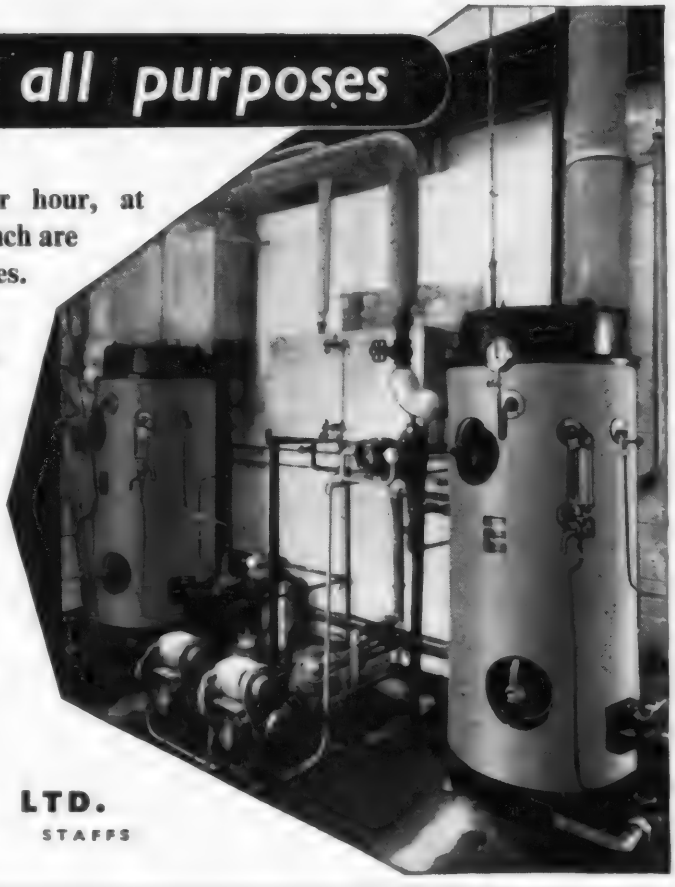

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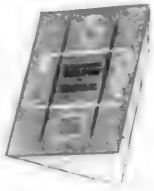

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QUALIFIED Chemist required by progressive Company Canning Fruit and Vegetables. Experienced in Quality Control essential. Excellent prospect for first class man, having the ability to develop new lines. Salary according to experience and qualifications.—Fullest details in strict confidence, to Box B4808.

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PURCHASING Officer required by progressive Company of Canners, to be responsible for the purchasing of all the requirements of the Company's Canneries, with the exception of Fresh Fruit and Vegetables. Knowledge of Plant and Machinery maintenance spares essential. Excellent prospects for right man.—Full details in strict confidence to Box B4810.

QUALIFIED Analytical Chemist required for established food manufacturing company.—Full details of age, qualifications and experience to Box ZA.214, Deacon's Advertising, 36, Leadenhall Street, E.C.3.

ASSISTANT Production Manager required. Age 25-30. Technical knowledge and some practical experience of Fruit and Vegetable canning and canning machinery. Salary around £500.—Apply stating age, experience, etc., to Derbyshire Canners Ltd., Eckington, near Sheffield.

CANNING Process Manager required. Must have had considerable experience in preparation and processing of wide range of fruit and vegetables and be capable of controlling large mixed labour force. Excellent prospects for first-class practical man.—Applicants should reply fully in writing giving age, education, experience and salary expected to General Production Manager, Foster Clark Ltd., Maidstone, Kent.

FIELDSMAN required for Fruit and Vegetable Cannery. Must have had experience in fruit and vegetable buying and in the arrangement of growing contracts with farmers. A sound knowledge of up-to-date growing methods is essential. Responsibilities will include inspection of growing crops and the initiation and maintenance of delivery system to the Canner.—Applicants should reply fully in writing giving age, education, experience and salary required to General Production Manager, Foster Clark Ltd., Maidstone, Kent.

TECHNICAL Sales Engineer required by manufacturers and fabricators of stainless steel equipment. Previous experience with brewery and food manufacturers desirable.—Write giving age and full particulars of technical qualifications, experience and stating salary expected to Box B4815.

CHIEF Chemist required for executive position with well-known Food Company in West London. To be responsible for Quality Control and Bacteriological Laboratories. Able to formulate new products in the food preserving trade. Knowledge of dairy industry an advantage. Applicants must have high academic qualifications and have had considerable practical experience in a similar capacity. Only men at present in receipt of a four figure salary need apply.—Write in confidence giving full details of age, qualifications and positions held to Personnel Manager, Box B4816.

HIGH-CLASS Squash and Cordial manufacturers require free-lance Salesmen on commission and expenses having live connections with hotels, grocers, wine merchants, etc.—Only those able to offer virile representation and introduce substantial business should apply, giving two references to Box B4821.

SALES Manager required to organise and extend the business of progressive Food Manufacturers operating in the Home Counties. Applicants should state experience, connections and salary required. This is an exceptional opportunity for a keen and enterprising man.—Box B4826.

CLASSIFIED ADVERTISEMENTS

In FOOD MANUFACTURE

MUST BE PREPAID

4d. a word, minimum 10s.

Box numbers, 1s. extra.

Replies to

BOX NUMBERS

should be addressed to

Food Manufacture, Stratford House, 9 Eden Street, London, N.W.1

SITUATIONS VACANT

THE Directors of the Co-operative Wholesale Society Ltd., invite applications for the position of Manager at the Society's Works at Pelaw, Gateshead, 10, County Durham, concerned with: (*a*) The production and packing of polishes creams, dressings and other cleaning material for leathers, furniture, metals also generaly drysaltery lines; (*b*) Preparation and packing of various food commodities; manufacture of self-raising flour and allied products. Applicants should have good technical qualifications or equivalent experience; be versed in Management techniques and functions and have full knowledge of current food regulations.—Applications, stating age, qualifications, experience and salary required, to be addressed to the Secretary and Executive Officer, C.W.S. Ltd., 1, Balloon Street, Manchester, 4, endorsed "Pelaw Works Manager."

CHEMIST.—Well-known Chocolate and Cake Manufacturers situated in the Midlands require Food Chemist, analytical control of raw materials, manufactured goods and the investigation of new products and techniques. Permanent position with good prospects.—Apply Box B4827.

EXPERIENCED Businessman, capable of handling various bulk lines in the food and raw material field, required by well-established firm. Great opportunities for right person. Salary and participation of profit would be considered.—Box B4829.

TRAVELLER REQUIRED BY B.C.H.

Outside representative wanted by Brierley, Collier and Hartley, Ltd. Bridgefield Street, Rochdale.—In first instance write to Managing Director marking letter "Private and Confidential".

ASSISTANT Supervisor required for Bacon Factory in Home Counties. Excellent opportunity for young man with some experience of bacon production.—Write, giving full details of present and previous employment, age, etc., to Box B4830.

OPPORTUNITY for enterprising Chemist to take control of edible oil refining and processing by the Votator method. Good salary coupled with percentage of profits for applicant with drive and initiative. Accommodation available.—Box B4788.

ASSISTANT factory manager for fruit and vegetable cannery of national repute, in Southern England. Must have ambition, initiative and drive, and ability to control labour. Managerial experience necessary preferably in the industry. Age 25-35. House provided, excellent prospects.—Write Box B4834 giving fullest details salary required, etc.

GENERAL Manager required by medium-sized Midlands firm producing high quality Pork products and Confectionery and retailing these together with Meat and Groceries. Good salary envisaged for man of experience. Accommodation could be provided.—Write stating age and experience to Box R.575, c/o Streets, 110, Old Broad Street, E.C.2.

SITUATIONS VACANT

REPRESENTATIVE required by well-known Food Manufacturing Company in the Midlands to call on manufacturers, including mineral water manufacturers, jam manufacturers, confectioners, sauce and pickle manufacturers. Some technical knowledge of food manufacturing an advantage. Consideration would be given to the employment of a lady with domestic science training or other suitable qualifications. Expenses and good salary commensurate with qualifications and experience.—Box B4832.

SITUATIONS WANTED

FOOD Technologist seeks position with progressive firm. Varied experience in food and allied industries, factory and laboratory control, factory management. Knowledge of industrial fermentation processes. Salary is a secondary consideration.—Box B4818.

MICROBIOLOGIST with experience in routine control and experimental work in many branches of the food industry, seeks responsible post at senior or executive level. Salary required is of secondary importance.—Box B4819.

MEAT Production Executive. Young and energetic, with extensive practical, technical and administrative experience of organising and controlling large, top quality production in meat and soup canning, fish and meat pastes, fresh and cooked sausages, pies and cooked meats. Seeks progressive appointment as Factory Manager.—Box B4828.

GENERAL Sales Manager considering change. Exceptional Practical and Administrative Experience Food Trade (manufacture, sales, marketing, distribution, transport, advertising, staff control) seeks responsible position progressive business where principal needs genuine, capable, conscientious assistant. Prospect eventual partnership or directorship. Excellent references, small capital, confidential.—Box B4831.

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DRIED VEGETABLES
DRIED HERBS
SEEDS & SPICES
GROUND PAPRIKA

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AGRICULTURAL AND CHEMICAL PRODUCTS LTD.
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Telephone: Monarch 6124-6 (3 lines)

The Strongest Vanilla Flavour
VANOLEUM
1 oz. (2/6) makes a pint of essence
4 ozs. 8/6. ½ lb. 16/6. 1 lb. 32/-
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CAPACITY UP TO 7' DIA. IN ALL METAL
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BUSINESS OPPORTUNITIES

VACUUM Evaporator for Low Temperature Concentration any liquid product, available off season.—Tipperary Products Ltd., Clogheen, Co. Tipperary, Ireland.

WELL-KNOWN Scottish Pie Makers can offer attractive terms to Agents with own transport. Goods despatched to any part of the country by passenger train. Branded line, goods packed in cardboard cartons, each containing one dozen.—Trade inquiries to : V. C. Pies Ltd., Glasgow. Tel.: Maryhill 1048.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for twenty years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam.—Write for leaflet 125, Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

OLD established Importers' Merchants desire contact home or overseas canners, view co-operation and development U.K. marketing. Financial assistance available.—Box B4813.

WINE Lovers. Interesting news for amateur wine brewers.—Write: Hidalgo, Market Place, London, W.1.

THE proprietor of British Patent No. 625012, entitled " Improvements in or relating to the manufacture of peanut butter," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14, E. Jackson Boulevard, Chicago, 4, Illinois, U.S.A.

COLD Store zero temperature with extensions up to 15,000 cu. ft. available with offices and yard. For sale, or to let on long lease, or on long term contractual storage terms for frozen goods.—St. Mary's Cold Store, Eynesbury, St. Neots.

TO LET on long or short lease. Mid-Somerset. Single-storey open-span brick-floored steel-roofed building of 20,000 sq. ft., with loading bays, fitted office and lavatory accommodation. Also 20,000 sq. ft. open yard space with stone-built block of six offices and 1,500 sq. ft. store. Two large self-contained flats available adjoining. All main services and unlimited spring water supply. Two goods stations. Petrol pumps, 30-ton weighbridge, two entrances.—Enquiries to E. G. S. Jackson, F.C.A., 81, Queens Road, Clifton, Bristol, 8.

JAMS, Marmalade, Lemon Curd and Fruit Squash Business, Midlands district. Clean and well-equipped Factory. Three boiling pans, mincer, mixer, labellers, syrup mixing pan, squash agitator, electrode steam boiler, etc. Three lorries and one 10 cwt. van. Office accommodation adjoining premises. Ground floor area of factory, 2,270 sq. ft.; first floor, 1,760 sq. ft. Freehold property.—Box B4796.

FACTORIES FOR SALE

TO Food Canners and Manufacturers. Excellent premises in Kent (London 26 miles, Maidstone 10 miles). Ideal for food canning, processing, etc. 50,000 ft. on 5 acre site. Freehold, £45,000, or might let.—Apply Manners, Hearne and Manners, Factory Agents, 45, London Wall, E.C.2. Tel.: Mon. 0794 (5 lines).

SECOND-HAND PLANT FOR SALE

LABELLING MACHINES

Reconditioned as new

PURDY · NATIONAL
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NORTH American Pure Refined Lard and Prime Steamed Lard at very competitive prices to Import Licence holders.—Box B4806.

PINEAPPLE Juice, Golden Circle Brand, A 10's, approx. 1,000 tins for sale, 62s. dozen; delivered.—Box B4812.

IMPORTERS -Portuguese firm offers Prime Green Olive Sulphur Oil, Raw Cod Liver Oil, Fish Oils, Fish Meal.—Silvades, (F.M.), Rua da Prata, 184, Lisbon, Portugal. Telegraphic address: Silvades, Lisbon.

APPLES for Canning, Jam and Mincemeat. 500 tons hand-picked Bramleys, machine graded 2¼ in.-2¾ in.-3 in. to your requirements. Also Swedes and Carrots for Canning. We shall be pleased to submit keen quotations delivered to your factory in 6-ton loads on receipt of your enquiry.—Horace Sullivan Ltd., Fruit Merchants, 133, Widemarsh Street, Hereford. Tel.: 2532 (4 lines).

TERYLENE, Nylon, Courlene Overalls direct from manufacturer. Write for patterns, prices—M. Ley, Dept. " F," 4, Shaftesbury Avenue, Kenton, Middx.

AGENTS WANTED

IMPORTERS of Whole Egg Powder and Dried Egg Products with own set-up in countries of origin require first-class Representatives with close connection to actual users.—Box B4820.

MISCELLANEOUS SALES

Factory Tables with
STAINLESS STEEL TABLE TOPS

5'8" × 3'8" (1½" lipped all round)

Firth's Guaranteed "CORROSION AND ACID RESISTING THROUGHOUT." These Trays or Tops were originally designed for culturing Penicillin and are offered as being unused. They have three reeds runnning lengthwise–They are seamless–No crevices into which waste materials can lodge–Easier for cleaning down. They are reinforced for heavy duty and the undersides are treated with a rubberised solution to repel condensation. Each Tray weighs ½ cwt. The finish is Industrial Semi-gloss with very slight defects. To form a table they are mounted on mild steel sectional underframes finished in White/Grey enamel.

Price: Table Tops £8. C.W.O.
Complete Tables £17.

THOMAS HOGG, 31 Wellington Rd., Whalley Range, MANCHESTER 16. Phone: MOS 3072

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CAKE AND GROUND

ALMONDS	DES. COCONUT
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Telegraphic Address : " Namsoluc, Swanley Orpington"

SECOND-HAND PLANT FOR SALE

FOR Sale: Automatic Carton Gluing and Compression Unit for Canned Products, etc., etc.—Box B4807.

VACUUM Drying Installation, comprising two horizontal cylindrical Scott Vacuum Driers, approx. 8 ft. by 42 in. diam., with motor-driven agitators, vacuum pumps, condenser, etc.—George Cohen Sons and Co. Ltd., Wood Lane, London, W. 12. Tel.: Shepherds Bush 2070.

UNUSED 42 in. " Weston " type electrically driven Centrifuge by Manlove Alliott, with bottom discharge, vulcanite linen basket and monitor case.—George Cohen Sons and Co. Ltd., Wood Lane, London, W. 12. Tel.: Shepherds Bush 2070.

FOR Sale: British Miller Hydro Washer, 2,500 bottles per hour with Perkins Filler 200 dozen per hour, and Ford Foil Cap machine. Equipment used three months only. —Unicream Ltd., 111, Broughton Lane, Manchester, 7.

CONTINUOUS Brine-making Machine by Mather and Platt, cheap to clear.—Unicream Ltd., 111, Broughton Lane, Manchester, 7.

KESTNER treble pass climbing Film Evaporator, evaporating capacity 100 gall. per hour, stainless steel, complete. Cheap. Also Kestner Spray Dry Plant, evaporating capacity 300 lb. per hour. Complete.—Box B4814.

TWO Vacuum Can Seamers for sale. Ashworth and Parker. Auto. feed. Cap. 3⅞ in. diam. by 4½ in. high. Motor driven.—Photo, etc, F. J. Edwards Ltd., 359, Euston Road, London, N.W.1.

PHONE 98 STAINES

CHRISTY and Norris Pulveriser, 24 in. by 16 in. Harrison Carter twin-spiked Roll Crusher, 18 in. by 12 in.; ditto, lighter type, 12 in. by 3 in. Jacketed " Z " blade Perkins Mixer, 29 in. by 29 in. by 22 in. Thirty " Z " blade Mixers up to 42 in. by 28 in. by 38 in. Chocolate Kettle, 3 ft. 3 in. diam. by 2 ft. 4 in. deep. Elec. heated 20 and 30 gall. tinned copper Pans (1948); ditton, w.s. and c.i. jacketed up to 300 gall. Unused elec. Stirring Arms, 400/3/50. Lehmann 4-pot Conche. Five-roll steel Refiners, 48 in. by 33 in. rolls, water-cooled rolls. De Laval Emulsifier with s.s. container, No. 2. 7,000 and 11,000 gall. glass-lined cyl. enc. Tanks. 1,500 and 1,000 gall. aluminium enc. Tanks. 36 in. Dragee copper Coating Pan. Pumps, conveyors, elevators, autoclaves, ovens, condensers, boilers, steam and diesel engines, etc.—Harry H. Gardham and Co. Ltd., Staines.

KELLIE " Rowans " Orange Quartering, Peeling, Separating and Pulping Machine. Also B.C.H. " Turnbull " Chipping Machine. Stainless steel parts and both fitted with self-contained motor drives.—Apply Box B4824.

BRATBY and Hinchliffe Automatic Bottle Labelling Machine, capacity 300 dozen bottles per hour. Fitted with motorised variable speed drive, new 1952 and in first-class condition.—Apply Box B4825.

DELLS Revolving Drum Mixer for granular or powdered materials in sizes 60, 10 and 1½ cwt. per charge. Southall Smith Flour Weigher and Packer for 1¾ up to 7 lb. and intermediate, with large bulk feed hopper and geared A.C. motor par excellent condition. Redlers chain-type Conveyor in steel trough. 150 ft. long, for grain, flour or granular or powdered materials, 10 tons hourly. Gardners 3- and 5-cwt. cap. Rapid Flour Sifters and Mixers combined.—Edward Booth, Booth Street Mill, Congleton.

FOR Sale: Gravity Conveyors, rollers 22 in. and 18 in. wide on 6 in. centre with bends. Crypto " Moroil " motorised Fat Extractor, 230-volt. Brockhouse 2-VS gas-fired Steam Boilers, 100-lb. pressure, 144-lb. evaporation. One in. motorised Milk Pump, 400-volt. Portway gas-fired Pastry Oven.—A. H. Kimmins and Sons Ltd., Lyndhurst Road, Worthing.

FONDANT Mixing Machine, jacketed, all-copper, by B.C.H., motorised, 400/3/50. " Peerless " 80/40-quart Bowl Cake Mixer, 230/1/50. " Berkel " Bread Slicer, bench type, 230/1/50. Two-head vacuum Bottle Filler, stainless. " Sharples " Super Centrifuge, motorised, 400/3/50.—Welding, Son and Co., Saxone Buildings, Tarleton Street, Liverpool, 1.

SECOND-HAND PLANT FOR SALE

ONE 50-gall. capacity copper steam jacketed Boiling Pan. Cast-iron outer jacket of bolted construction, arranged for hand tilting, and mounted on usual cast iron stand. Suitable for 50 lb. per sq. in. working steam pressure. One 40-gall. capacity ditto. This is at present certified for use at 30-35 lb. per sq. in. steam pressure, but would probably certify for higher pressure, if desired. Prices upon application.—Birmingham Chemical Co. Ltd., Wiltell Works, Lichfield, Staff.

PLANT FOR SALE

GRINDING MILL, New November 1953, Kek No. 1 size. Direct coupled 30 H. P. motor—HENDRON BROS. (Machinery) LTD., DUBLIN.

COMBINED Sifting and Mixing Machines, sizes 5 cwt. and 3 cwt. ex stock.—Makers: D. Burr and Son Ltd., Drayton Place, West Croydon.

GARDNER Mixer, as new, used only a few months, motorised, model L. GG. 3 cwt. size. One 5 cwt. size as new, Burr Sifter and Mixer, as used for self-raising flour, custard powder, etc.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

FOR Sale: One Peerless Mixing Machine with bowls. 100 qt. capacity, almost new. Cost £550, will accept £250, also 80-qt. Peerless with bowls, mixers. Price £100.—Box B4811.

ONE Southall and Smith Automatic Weighing Machine, as new, suitable for packages of ½ lb. to 1 lb. Machine includes 1½ h.p. geared motor, 1 rectifier for vibrator and a 2 ft. 6 in. square bulk feed hopper. Date of manufacture 1946. Can be seen at our Westbury Factory at any time.—Write to Chief Engineer, Aplin and Barrett Ltd., Newton Road, Yeovil, Somerset.

GARDNER Sifter and Mixer, size E, 150 lb. capacity, in good working order.—Frank Stacey and Co. Ltd., Vauxhall Street, Birmingham, 4.

MEAT-CUTTING Electric Bandsaws. New high-speed machines for sale. Stainless steel or wood table. Three sizes 24 in., 30 in., 36 in. Maximum height of cut on 36 in. machines 19 in. 400 440 3-phase supply. Photo and prices from makers, F. J. Edwards Ltd., 359, Euston Road, London. EUSton 4681.

GLASS-LINED Tank, 1,000 gall., unused, new, two for sale. Automatic Weighing Machine, new, Valco model S1, at present adjusted to 2 oz. Suitable for toffees, sweets, biscuits, fruit, crisps, beans, lentils, tablets, pastilles, screws, washers, etc. Adjustable to 14 to 25 weighings per minute.—British Chemotheutic Products Ltd., Grant Street, Bradford.

HOMOGENISER, stainless steel Tanks and other equipment, excellent condition.—Box B4776.

SOUTHALL and Smith automatic Weighing and Filling Machines up to 3 and 7 lb. Gardner, size G, Sifter Mixers. Young 600 lb. Sifter Mixer. Drum Mixer, 7 ft. by 8 ft. long. Kek Mill, No. 3, with 15 h.p. motor, etc.—Dartnall, 248, Humberstone Road, Plaistow, London, E.13.

Powell & Co., 'Drum Master' Works, Barry Port, Carms.

PLANT FOR SALE

ONLY the original manufacturers can really recondition a machine as new, so when thinking of buying a second-hand Purdy Labelling Machine first contact The Purdy Machinery Company, Limited, 41-42, Prescot Street, E.1. Tel.: Royal 8401, who have, from time to time, completely rebuilt and fully guaranteed machines available.

SECOND-HAND PLANT WANTED

ONE Mather and Platt Universal Filler. —Fullest particulars, Warrington Canners Ltd., Riverside Works, Penketh, Warrington.

BRISKRAP Machines required. Please give fullest details, stating age, price required, where can be seen.—Box B4817.

ADVERTISER requires Peerless and Ericsson P.M. 100 Dough Mixing Machine, complete with bowls and attachments. Specifications 350 volts, 50 cycles, 3 phase. Good price given for good second-hand machine.—Box B4822.

WANTED. Marshmallow Depositor, capable of depositing pre-determined amounts, with or without cocoanut sprinkler, also small chocolate pump with or without motor. Full particulars.—Box B4823.

WANTED

Washing machine for handling cans before retorting. Warrington Canners Ltd., Riverside Works, PENKETH, Warrington.

MISCELLANEOUS WANTS

WANTED: regular supplies of Clean Second-hand 1 lb. Jam Jars, up to 2,000,000 per annum. Best prices paid.—Box B4804.

I BUY discontinued lines, old stocks, small or large lots, canned goods, chocolates, sweets, groceries, biscuits, hardware, chemist's sundries, polishes, soap powders, fancy tins, cardboard boxes for packing chocolates, sweets.—Paul, 413, Bury New-road, Salford, 7. Tel.: Broughton 2700.

ADVERTISER purchases Waste Fats and Oils. Give full details and forward samples to L. R. Stevens, " Stella Maris," Dirtham Lane, Effingham, Surrey. Tel.: East Horsley 3229.

REQUIRED redundant Wooden Boxes, Cases, Bottle Crates and Containers in large quantities.—Full particulars price etc., to Silverdale Box Supplies Ltd., Burgess Hill, Sussex. Tel.: 3485.

MEDICAL bottles; tablet bottles; jars; bottle closures, bakelite and metal purchased. Best prices paid.—Samples and full details in first instance to Noel Davold and Co., 9, Laurence Pountney Lane, Cannon Street, London, E.C.4. Tel.: MANsion House 3951-2.

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

TO MANUFACTURERS OF PRE-PACKED FOOD LINES SUITABLE FOR THE RETAIL OR CATERING TRADE

Have you any dormant or slow selling goods that you wish to clear which are taking up valuable space? We are spot cash buyers for any quantity of the above.

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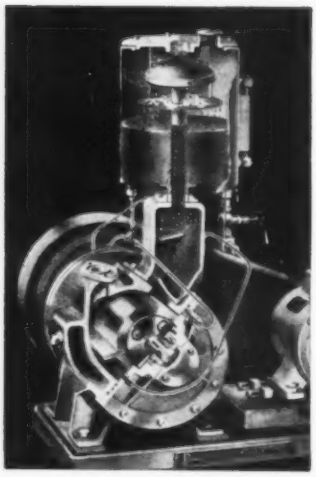
FOR FACTORY OR LABORATORY PURPOSES



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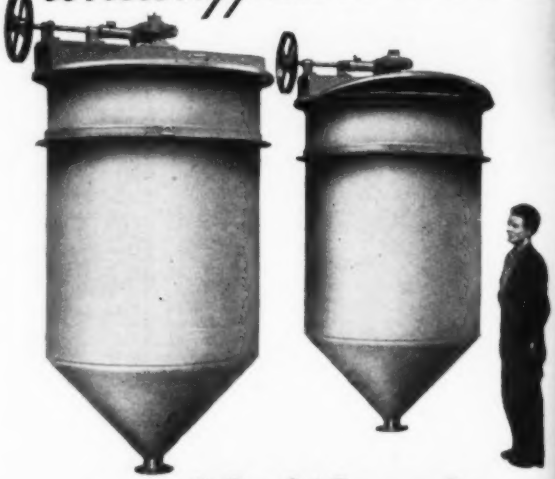

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Permoglaze is the ideal coating for walls, woodwork and plant in food factories and wherever brightness and cleanliness are desired.

Easily applied, Permoglaze sets with a hard, glazed surface which is easy to keep clean. Its tile-like finish withstands steam, condensation, washing and hard wear.

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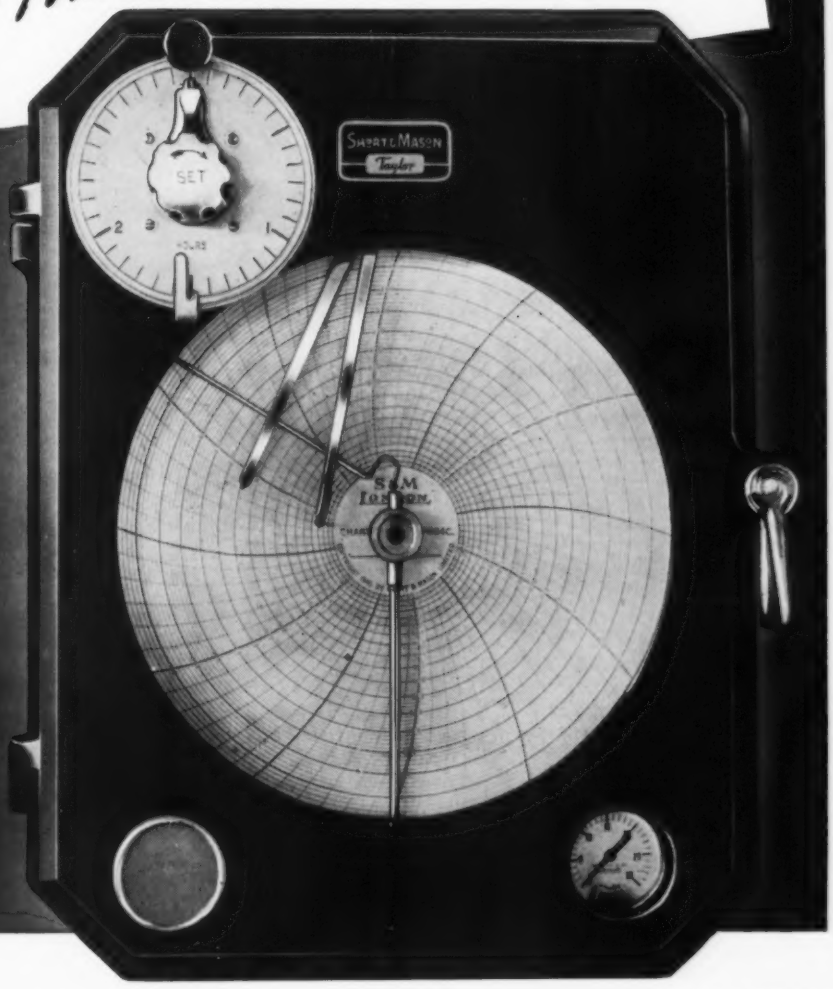
Fruit and Vegetable Cooking will soon be here! MUST INSTALL Short & Mason Process Timers on our retorts



Safeguard your reputation for quality with the Short & Mason Process Timer, which eliminates manual timing in batch processing and ensures a consistently high standard for your canned or bottled products. The operator has only to load the retort and set the timing knob—the process timer raises the temperature automatically, holding it at the set point for the duration of the cooking period. The instrument then automatically cools the batch ready for unloading. *Send for full particulars.*

SHORT & MASON MEANS ACCURACY FIRST

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(A SUBSIDIARY OF *Taylor Instrument Companies* U.S.A.)

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SELF OPERATING REGULATORS

For the control of Boiling Tanks, Calorifiers, Oil Heaters, Storage Tanks, Washing Machines, Oil Bleachers, Wool Scouring, etc.

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with the Drayton complementary automatic switches to control the flow of gas, steam, water, oil or other fluids, through pipe lines.

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For proportional electric control to maintain constant temperature or indoor/outdoor control of Heating and Air Conditioning.

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Air-operated with recording and cycling feature for close control of Industrial Processing, large Heating Plants, Test Plant, etc.

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Compressed air and water operated, for pressure reductions, transfer or surplussing. For the highest temperatures in common use.

EXPANSION STEM REGULATORS

Operated with air or water for the control of Air-conditioning Plant, large Calorifiers, Diesel Coolant, Bottle Washers, etc.

The Model 50 "Dial Set" air-operated process regulator for temperature, pressure and draught control.

A complete range of

AUTOMATIC CONTROLS

of the highest reliability

Drayton regulators for temperature and pressure are notable for their dependability and the degree of accuracy continuously maintained. They comprise self-operated types, air- and water-operated regulators, and electrical systems with the complementary control apparatus for each particular application. Drayton can give impartial advice on the most suitable control for the job... we are not tied to one system. Our technical staff can advise on any scheme from the widest experience. Send us details or write for the Drayton Catalogue.

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